The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXXIX. August 27, 1938 No. 1,000

The 1,000th Issue

TO-DAY'S issue is the 1,000th consecutive weekly number, a milestone in the history of the journal. THE CHEMICAL AGE first appeared on June 21, 1919, and was published at a time when British chemical industry had made enormous strides in the exigencies of the war years brought about by the full realisation of the predominance of the German chemical industry and its products. In the words of the late Sir Edward Thorpe in a special message to the first number: "The particular time of its appearance is most opportune. It will serve to bring home and to emphasise the lessons of the strenuous years through which we have recently passed. There can be no question that British chemical industry has received an impetus such as only the shock of a great and prolonged European war, fought under modern conditions and with every appliance that science could suggest, could have given it.

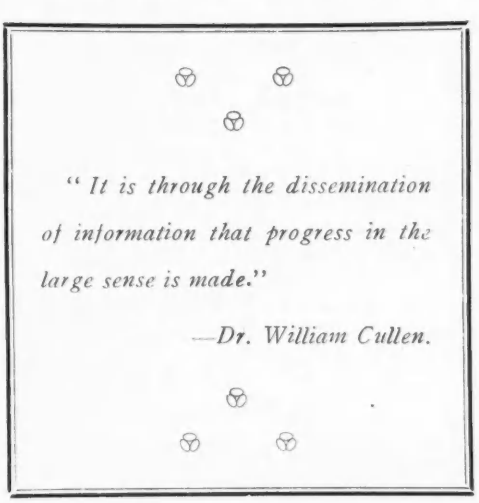
"The State is now more than ever alive to the paramount importance of science to the national welfare. It recognises, indeed, that its very salvation is in no small measure due to the applications of chemistry. The first few months of the war brought, as we well remember, a rude awakening in this respect. The country at large, for the first time, realised how dependent it had become on Germany for much that was essential to its well-being and economic position. This realisation roused some of the most characteristic qualities of our race. The four years of war have probably done more than forty years of peace to quicken our recognition of the jeopardy in which we stood. They have strengthened our determination to regain that supremacy in the chemical arts that we formerly enjoyed."

The original policy of the journal was therefore clear-cut. It was our special aim to support all movements for the development of the British chemical industry, whether from the scientific or industrial point of view. The particular needs of that time were to build up a progressive industry on the foundation of the gains made during the war and to ensure that Germany should not again be such a leading influence in world chemistry.

The last twenty years have seen an enormous change. Not only did our chemical industry realise the great opportunity before it, and the pressing necessity for strengthening its position, but it acted upon the realisation in a rapid and efficient manner. The almost limitless prospect which lay in front of the progress of chemistry also had a most valuable effect on education. Science was taught to a far greater extent and the universities co-operated with industry, supplying the chemists so urgently required in a fast-growing group of manufacture. This, and the establishment of research associations supported in many cases by industry, were two prominent factors making a vital contribution to the industrialists' own efforts in manufacture and research. The hopes expressed at the close of the war have been amply fulfilled; the British chemical industry is to-day in the forefront of the nations.

While this country recognised that the war had changed the whole aspect of industrial chemistry, we were not alone in so doing. America, and to a smaller degree France and Japan, were conspicuous in their great attempts to set up permanent chemical manufactures and to compete in the world's markets. Germany also, while not regaining her former position of practically isolated pre-eminence, went steadily ahead until to-day, as everyone knows, her chemical industry is one of the finest in the world. The post-war period has thus been characterised by progressively more intensive competition. Within the last few years wars and rumours of wars have made still greater activity in chemical industries and overseas trade has become even more competitive. National policies of self-sufficiency have provided great opportunities for the chemist, especially on the Continent. His achievements with this end in view have been remarkable, but they have added another difficulty to the problem of overseas trade.

Thus there is one similarity in the conditions immediately after the war and those at the present time. In 1919 the problem was so to forward British chemical industry that it took its position amongst the most important in the world; to-day it is to hold that position in face of ever-growing competition. Constant industrial development and research is just as necessary in the urgent problem of to-day as it was in the problem of 1919, now successfully solved. It will continue to be our aim to support and inform this policy as effectively as possible.



"It is through the dissemination of information that progress in the large sense is made."

—*Dr. William Cullen.*

Notes and Comments

Timber Research

THE annual report of the Forest Products Research Board, extracts from which are given on another page, shows the wide variety of problems investigated by the Board. In recent years new materials have been introduced which tend to replace wood in certain applications. Accordingly, the Forest Products Research Laboratory at Princes Risborough was founded by the D.S.I.R. with the primary object of finding new uses for wood and of making it fulfil its former duties more effectively by more careful selection and proper treatment. As a complete understanding of the nature and behaviour of wood is necessary before it can be used to the best advantage, a large part of the laboratory's programme of research is devoted to this work. During the past year researches on the hemicelluloses of oakwood have been continued and the action of certain oxidising agents on wood investigated. Other sections of the work of interest are concerned principally with improving wood for domestic and industrial purposes. For instance, the moisture-resisting qualities of various paints on wood have been tested by a method developed at the laboratory and a study has been made of the fire-resistant properties imparted by chemicals through impregnation. A most interesting section of the report deals with the continuation of the survey of laminated wood-synthetic resin products.

Prospective Developments of Plastics

IN the current issue of the *Journal of the Franklin Institute*, Dr. G. O. Curme reviews the present state of our knowledge and the industrial applications of synthetic substances of large molecular size. His remarks on the probable developments of synthetic plastics in the future are perhaps of most interest. Production costs are high and he believes that the full benefits of mass production are still to come when eventual economies have been effected. Further technical improvements are sure to be made on both the chemical and mechanical sides of production. Shrinkage in moulding produces stresses in the finished article which limit the size of the pieces which can be produced. This is being slowly overcome and should improvement be carried further, Dr. Curme visualises the production of pieces of a size such as used in furniture, leading to a rapid increase in the consumption of plastics. It is certain that plastics will be in very keen competition with wood, for both decorative and utilitarian purposes, in the near future.

Containers for Transport and Storage

MANUFACTURING processes may end with the production of the final product, but it is the ultimate aim of all classes of commercial manufacture to deliver the product to the customer in just as good condition as it left the factory. Delivery can, and should, be considered as a vital link in the production chain. A weakness in this link can result in serious loss and undoes all the advantages which may have been gained through the excellence of the manufacturing stages. This is especially true in chemical manufactures. The trouble taken to acquire a manufacturing technique of a high order is almost set at nought if the product is damaged in transit to the customer either by contamination through the use of a container made of unsuitable material or through loss due to breakage. The manufacturer should therefore carefully consider the type of container best suited for his purposes. There are many factors to be borne in mind in making a selection. The nature of the product is of primary importance; it may have a high bulk density requiring a strong package, or be volatile, corrosive, or come into the category of dangerous goods in which case the container must fulfil the requirements made by the transport authorities. The cost of the container, considered in relation to its use as a returnable or non-returnable package, and its appearance must also come under consideration. The advice of the container maker should be sought in cases of difficulty, and this co-operation is especially useful where a special product is to be transported or stored and it does not appear that one of the many standard containers would be satisfactory. This issue is designed to draw attention to some of the containers available and to the regulations regarding the transport of chemicals.

A Plan for Stocks of Raw Materials

AN ingenious plan of storing raw materials was put forward by Mr. J. M. Keynes in a paper read to the British Association on Friday of last week. The object of the scheme is two-fold: it would provide reserves for any future war-time emergency, and it would prevent wide variations in commodity prices. The Government already has the power, through the Essential Commodities Reserves Act, to induce the individual trader to hold stocks surplus to his normal requirements. Mr. Keynes suggests that the Government should offer storage to all Empire producers of specified raw materials, either free of warehouse charges and interest or for a nominal charge, provided they ship their surplus produce to approved warehouses in this country. The goods would remain in private ownership and the Government might offer to advance up to 90 per cent. of the market price at the date of delivery. This would greatly remove the inclination to sell when prices were low. It is estimated that the scheme would cost about £20,000,000 a year for the storage of materials of £500,000,000 in value. Whether this cost would be justified against the compensating advantages, represented principally by the elimination of the risk to manufacturers of sharp fluctuations in the prices of their raw materials, can only be determined by careful examination.

Trade Cycles

A PESSIMISTIC view of the immediate future of trade was taken by Sir William Beveridge at the British Association meeting on Monday. He was of the opinion that the trade cycles manifested in the past would continue with comparable frequency in the future, and, moreover, that the history of the first stage of the 1930 depression was being repeated to-day, with textile and metal manufactures leading the way. If trade fluctuations take place with the regularity exhibited by statistics, the causative factors must alter little with time. But economists have not yet agreed on the factors responsible. From an examination of the figures, Sir William Beveridge concludes that fluctuations in export trade play a leading part. In pointing to the key position occupied by this trade, he adds the weight of his authority to the opinions already expressed by others, but there still remains the problem why export trade should follow a wave-like course. Whatever the reasons may be, it is hardly credible that no action, and considerable action is being taken to increase our exports at the present time, can cause deviations from a pre-destined path.

Metal Drums and Cans for Transport and Storage of Chemicals

By
A. G. WRIGHT

SUPPLIERS and users of chemicals, alike, have much to be thankful for in the invention of the metal drum. It provides a convenient and safe method of transport, one which is easy to fill and easy to empty, and one which may be so modified in construction that all conditions of handling can be adequately met. Introduced in the first instance almost exclusively as a means of transport for liquids, metal drums are now equally favoured for semi-fluid products and powders. Metal drums have a definite advantage over wooden barrels, in that leakage can be reduced to the absolute minimum, simultaneous with the provision of a package which guards against deterioration of the product in peculiar circumstances and also against contamination. As the drums can be constructed from metal of different thicknesses, a range of strengths is offered to meet different transport conditions. On the one hand there is the drum made of light gauge metal which provides a convenient package to meet all the needs of a single journey; on the other hand, the use of heavier metal allows many journeys and in special cases may give unlimited life for the most hazardous of journeys.

The light gauge or so-called non-returnable drum, considered separately, is something more than a mere container for transport purposes. It also provides a convenient means of storage at the users' works, irrespective of whether short or long periods of storage are demanded. The actual cost is borne by the user of the chemicals, or in any case it is passed on to the user, either invoiced separately as "drum" or as an item making up the actual sale price of the product as charged to the user; the user, on his part, has the advantage of having his chemicals packed in a form which can be emptied as and when needed, meanwhile being kept in perfect condition as regards purity and other conditions of quality. At the same time the supplier of the chemicals suffers no financial disadvantage in having capital locked up in providing containers which are not giving continuous service to him from a transport aspect, and he is also relieved of the extra book-keeping involved in charging and crediting the return of the empty drums.

Metal Drum of Heavier Gauge

The heavier gauge metal drum, made for the purpose of giving continuous service between the manufacturer and the user of chemicals, is also demanded in special cases by the need of a container which will give perfect safety in the transport of products of a hazardous nature by reason of corrosive properties or a tendency to cause fire or explosion. The

A steel drum made by Fredk. Braby and Co. Ltd. It is of medium weight, all joints being welded and the rolling hoop expanded from the body.

drum may also guard against contamination of a particular liquid by being made from a special quality of metal; perfect leak-proof joints in the case of the all-welded drum have an added virtue by insurance against the loss of valuable liquid, however small that loss is likely to be. This type of drum is now constructed with great attention to detail and the efficiency of welding or otherwise making the joints between the cylindrical body or shell and the ends or heads.

Non-returnable drums, for convenience of construction, are almost exclusively of the true cylindrical shape, that is, they are of equal diameter from end to end or so-called "straight-sided" drums. In the case of the returnable drum, however, two definite shapes are available; one has equal diameter from end to end, the other—the so-called "bilged" drum—has a bilge reaching its maximum diameter at the halfway mark between the ends, or is better described as being of true barrel shape to facilitate turning when being rolled about and manœuvred into position. Due to this bilged or bulged middle, such drums are also much more easily turned up on end when full. For the truly cylindrical drum two or more rolling hoops have to be provided to make easy the task of

A drum, specially designed for export, produced by E. A. Brough and Co., Ltd. It gives a maximum capacity for minimum over-all dimensions. The ends are slightly concave round the edges, but are brought back again to the square at the top of the container in order to make use of every inch of the external measurements.

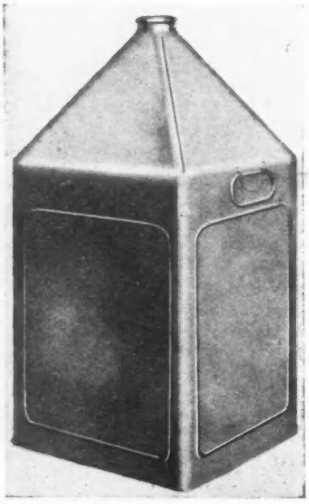
rolling, but the trouble of turning from one direction to another does not receive any attention in the form of a refinement in construction. The arched construction of the bilged shape definitely stiffens the body of the drum and gives greater resistance against severe blows.

In the case of the non-returnable metal drums rolling rings made of I-shaped metal are generally substituted by an annular ring pressed from the cylindrical body of the drum, as this reduces the cost of manufacture, which definitely becomes an important item demanding consideration when it is fully passed on to the user of the chemicals; means for easy rolling, it is obvious, are equally necessary in non-returnable and returnable types. The non-returnable drum, in addition, is or may be provided with a body of corrugated construction over the greater part of its length to give added strength which is so necessary when metal is reduced in thickness to save cost. Thickness of metal will vary for different drums according to the type of product which is to be packed; in the case of granules or crystals a definite degree of internal abrasion may be experienced in addition to corrosive ill-effects.

In selecting a metal drum the supplier of chemicals must first decide whether his product demands more than special

care in transport, thereby calling for a returnable drum with special attention to metal or some form of internal lining, and in details of construction, or whether a non-returnable type will provide the service of transport at a cost which is not unduly high to pass on to the user of the chemicals. Certain needs of the user have also to be considered, storage for short or long periods being at his discretion. For the returnable drum special care should be taken to see that all the seams and joints are of a type which will really withstand very bad handling should the occasion arise. Filling and emptying holes must be sufficiently strong and rigidly fixed to avoid distortion when the screw plugs are tightened or released; in these acts there must be no possible risks of wrenching the spud or socket from the body of the drum, or of straining the adjacent weld. A drum with all-welded side and end seams provides the pattern which is most leak-proof; if the end seams are caulked the material used must be of a nature which is unaffected by any liquid for which the drum is used, special precautions being kept in mind where penetrating oils and spirits are concerned.

The main consideration in respect of the returnable drum is that the metal must be sufficiently strong to survive one journey, which may be of long duration with a fair amount of rough handling if there is need of loading and unloading several times in the course of that journey from the supplier of the chemical to the user. Metal which is too heavy cannot be tolerated on account of increased cost not only for the actual weight of metal, but also in intensified difficulties of manufacture Particular attention has to be given to the ends or heads, so that if the drum is dropped heavily there will be a minimum risk of breaking open. Single journey drums may not be so well finished in general appearance, by comparison with the returnable drum, but this does not detract from their use save in exceptional circumstances provided that the adopted method of construction is a good one and the efficiency of all seams and joints reaches a certain level.



The Square Taper pack made by F. Robinson and Co., Ltd. It is of attractive appearance and its design and balance facilitate handling and emptying. The construction of the pack is strong, as the body and top are all made from one piece of metal and the shoulders are reinforced.

Emptying holes which are provided at one end of small drums should be placed as close to the edge as possible, in order to facilitate pouring without loss of liquid, and that the entire contents of the drum can be removed. Large drums are usually emptied from a hole on the side, with the advantage of using a syphon or some similar device to assist in the easy control of the flow of liquid. A drum which cannot be emptied "to the last drop" is unsatisfactory to the person who has bought the chemicals. For this reason the spud should not project into the interior of the drum unless ports are drilled in the spud at interior level of the metal body of the drum. So far as drums for powders are concerned, the "full open" head is preferable to all others because it is easier to clean the entire interior surface and the drum is also emptied with greater ease and assurance.

Just how long a drum of the returnable type will last is a matter of great concern to the owner of the drums, and some means for ascertaining the safe limits of life must be adopted wherever a very large number of drums are in use, or in any case where there would be a definite danger arising from an unforeseen accident due to the failure of the drum. Every supplier of chemicals should inspect drums at regular intervals in order to detect minor injuries, but as much as this practice is desirable it is not commonly found. Concerns which make use of a very large number of drums sometimes keep a careful check on weight and put them out of service when a certain minimum weight is reached, inspection to determine any necessary repairs being augmented in some instances by seeing that the drums will still pass tests which determine their degree of safety.

To continue to use a returnable drum until it reaches the condition of being able "to stand just one more journey" is a policy which must be emphatically condemned, because the risk of failure upon that last journey is much greater than in the case of a drum which is purposely made for one journey and does not accumulate the ill-effect of many strains over a long period of usage. The joint around the filling or emptying hole is usually one of the first parts of the drum to show signs of failure. Frequent repainting will do much to lengthen the life of a returnable drum by protecting it against the influence of varying conditions of weather. Perfect drainage will avoid serious corrosion internally; it is the small amount of corrosive liquid left in an "empty" drum which does the most damage.

Coatings for Internal Sources

Regarding interiors, it must be mentioned that heavy drums of the returnable type can be provided with a variety of internal surfaces to meet different conditions of possible corrosive action. Baked-on coatings, applied at temperatures of 200 to 600° F. for twenty to thirty minutes, generally prove to give a wide degree of satisfaction, but the real efficiency of any such lining will depend upon the degree to which the metal has been cleaned prior to applying the coating material. Except in a few instances, the need of special linings may be overcome by taking a little more trouble to select the steel of which the drum is to be made. Stainless steels are now obtainable for handling nearly all chemical liquids which are shipped in notable quantities, and much wider use should be made of such steels, although difficulties may be encountered with regard to welding or heat treatment. Nevertheless, for the handling of certain liquids where corrosion may be particularly severe, as in the case of glacial acetic acid, acetic anhydride, or pure phosphoric acid, drums made of stainless steel containing a small amount of molybdenum will prove advantageous.

Metal cans for liquid products offer great advantage in their diversity of capacity and shape. They can be cylindrical with conical tops or of square cross section with pyramid tops—more simply referred to in both cases as round and square "tapers." These tapered tops make it easy to remove the contents either completely or in small quantities, but they serve another important purpose of preventing such cans being stacked one upon another with risk of bursting open the seams of the lower layer by superimposed weight. Square tapers, by contrast with the common round taper, offer a particular advantage from the floor space saving aspect in transport, because the whole of the floor space in a railway wagon or lorry can be utilised; in addition the four flat sides of the can are sometimes an advantage for displaying the name of the manufacturer and product.

BOMBAY UNIVERSITY has satisfied a long-felt want by recently opening the University Department of Chemical Technology "to build the superstructure of industrial development in this country" by training selected graduates in science from all over India in chemical engineering.

The Transport of Chemicals in Great Britain

(SPECIALLY CONTRIBUTED)

THE term "chemicals" covers a very wide range of products. Many are quite innocuous and are treated as ordinary or "non-dangerous" traffics for transport purposes; others are classified as "dangerous," owing to their nature, and require special precautions in order to ensure their safe transit, and to avoid damage to other goods, or to the vehicles in which they are conveyed.

For rail transit, the Railway Clearing House issue, periodically, two classification books—the "General Classification of Goods by Merchandise Trains" and "Dangerous Goods by Merchandise Trains," which can be purchased for 2s. 6d. each, although copies are kept for public inspection at all railway goods stations without payment of any fee. These classifications not only indicate what charges are applicable for rail transit, but also set out in many cases what type of package should be used, and, for dangerous goods, the precautions to be observed; all concerned with the transport of chemicals should be acquainted with their provisions. Manufacturers usually adopt the same methods of packing for road transport as for rail transport, and road hauliers find these books a valuable guide in the conduct of their business.

"Non-Dangerous" Chemicals

The transport of "non-dangerous" chemicals presents little or no difficulty, as they are free from restrictions, and it need only be stated that, for rail transport, the cheaper products are largely covered by what is known as the "Chemicals List B," and charged at Class 8 rates when in 4 ton lots, sent loose or packed as specified; Class 10 rates for 2 ton lots and Class 12 rates for smaller quantities, while the more valuable products are charged at rates ranging from Class 9 to Class 18, and chemicals and drugs not specifically named in the classification, if non-dangerous, are charged at Class 18 rates when packed in sacks, cans, casks or drums, and at higher rates when in cases, hampers, jars, carboys, etc.

The fact that so many chemical products are highly rated by the railway companies for charging purposes has diverted much of this traffic to road transport, as it loads equally as well as the lower-rated traffic and the actual cost of haulage is the same. The higher value of the commodities does not warrant any appreciably higher charge, and is easily covered by the average road hauliers insurance policy.

Rail Transport of "Dangerous" Chemicals

With regard to "dangerous" chemicals, reference has been made above to the dangerous goods railway classification, which contains special regulations under the following headings:—(1) Explosives; (2) inflammable liquids Class "A" (flashing below 73° F.); (3) inflammable liquids completely soluble in water and compositions made therewith, flashing below 73° F.; (4) inflammable liquids Class "B" (flashing below 150° F. but not flashing below 73° F.); (5) dangerous, corrosive and poisonous chemicals, Section 1; (6) dangerous, corrosive and poisonous chemicals, Section 2; (7) miscellaneous.

The railway companies only undertake the conveyance of these products on special conditions to be signed by the sender and the goods must be packed as specified in their regulations. One of the principal requirements of the consignment note is an indemnity by senders against all loss or damage or claims made upon them for injury to person or property arising from non-compliance with the regulations, unless due to wilful misconduct of the company or their servants.

Explosives are conveyed subject to the byelaws made in pursuance of the Explosives Act, 1875, which provide for 48 hours' notice in writing of intention to despatch, with details of names and addresses of sender and consignee, true name, description and quantity of explosive, also loading and unloading during hours of daylight, smoking not allowed, modes of packing and labelling, etc.

Inflammable liquids must not be stored in enclosed sheds or warehouses and must be packed and labelled as specified in regulations.

Dangerous, corrosive and poisonous chemicals, so far as those in Section 1 are concerned must not be stored in enclosed sheds and warehouses; those in Section 2 may be stored except when packed in carboys. The lists cover sheep dips, weed killers, cyanides, bleach liquors, acetic, nitric, hydrochloric and sulphuric acids, phenols, chlorates, chlorides, nitrates, benzole and toluole derivatives, ammonia solutions, caustic and potash liquors, cleansing powders and pastes, disinfectants, etc. Modes of packing and types of package are specified, and instructions given as to labelling of packages. Certain products must be loaded in covered vans, or be sheeted, when packed in casks or cases. Others need not have each package labelled when truck loads are sent, provided the truck itself is labelled. Others again are not to be handled by the railway staff when packed in casks, and certain commodities are only accepted when special declarations are made in writing. Carboys and jars are only carried at owners risk.

The miscellaneous section covers carbide of calcium, phosphides of calcium and zinc, matches, compressed gases, zinc dust, oily waste and canvas, carbon black, charcoal, spent oxide of iron, etc., and provides regulations for packing and labelling, with details of approved packages, filling ratios for cylinders and tank wagons carrying compressed gases, instructions as to storage in warehouses and loading with other goods.

Road Transport of "Dangerous" Chemicals

For road transport, the only restrictions at present in force relate to:—(1) Explosives; (2) petroleum spirit and allied products; (3) bisulphide of carbon; and (4) permanent gases.

The conveyance of explosives on roads is governed by byelaws issued by the Secretary of State under the Explosives Act, 1875. These byelaws set out which explosives may or may not be conveyed by road with other explosives or substances and specify precautions to be taken with regard to prevention of risk of fire—prohibition of smoking, etc. The quantity of explosives to be conveyed in any one carriage must not exceed 2,000 lb. unless the carriage be so enclosed with wood or metal on all sides as effectually to protect the explosive against accident by fire from without, in which case the limit allowed is 4,000 lb. in any one carriage. When two or more carriages are travelling together, a space of at least 50 yards shall be kept between each, unless circumstances render it impracticable for this to be done.

Petroleum Spirit and Allied Products

When conveyed by road otherwise than in tank wagons, all packages of petroleum spirit and allied products must be strongly made and securely closed, and protected by a cover. If a motor vehicle is used, it must be provided with a fire-resisting shield, carried up above the height of the load and down to within 12 inches of the ground. When using a fuel which flashes below 150° F. the fuel tank and the exhaust must be wholly in front of this shield. Loads must not project beyond the sides or back of the vehicle.

When conveyed by road in tank wagons, the capacity of the tank must not exceed 2,500 gal., in compartments which must not contain more than 600 gal. each. The regulations specify various details as to the construction of the wagons, the precautions to be observed when filling and discharging, the use of trailers, mode of electric lighting, etc., and two persons must be in attendance if more than 1,500 gal. are conveyed in one vehicle.

Bisulphide of carbon, when conveyed by road in vehicles other than tank wagons, must be packed in steel or iron containers of not more than 50 gal. capacity, constructed as

specified in the regulations, or in luted bottles containing not more than 7 lb. each, packed in sawdust in strong wooden cases, no one to hold more than 30 lb. of bisulphide of carbon. Packages must not project beyond the sides and ends of the vehicle and an airspace of at least 7½ per cent. must be left in each container. When sent in tank wagons, not more than 1,000 gal. in one vehicle is permitted. Various precautions must be taken both with respect to filling and emptying and as to the lighting of the vehicle. All packages must be labelled "highly inflammable" and the regulations must be shown to all drivers, or posted up where they can be read by all concerned.

All cylinders used for permanent gases must comply with specifications laid down and the test prescribed. They must be maintained in good condition and their valves securely closed to prevent leakage. They must not project beyond the sides and ends of the vehicles and must be firmly secured. They must be legibly marked or labelled with the name of the gas they contain, and the name and address of the person or firm by whom the gas was compressed. Various rules are made as to pressure, protection of valves, hydraulic tests, colour schemes for identification, attention of drivers to be called to the rules, etc.

The transport of poisons is specially mentioned in the Poisons Rules, 1935, made under the Pharmacy and Poisons Act, 1933. Rule 24 makes it unlawful to consign any poison for transport unless it is sufficiently stoutly packed to avoid leakage arising from the ordinary risks of handling by transport, whilst Rules 16 to 22 provide for the labelling and types of containers to be used.

Labelling of Packages

The labels required for rail transport of dangerous, corrosive and poisonous chemicals are :—

"*A*" *Label.*—"*Poison,* not to be loaded with foodstuffs or foodstuff empties."

"*B*" *Label.*—"*Keep far apart* from foodstuffs and foodstuff empties."

"*C*" *Label.*—"*Caution.* Not to be loaded with foodstuffs, foodstuff empties, textile fabrics, paper, nor any goods in paper, wood, or fibreboard packages."

"*D*" *Label.*—"Not to be loaded with acids."

"*E*" *Label.*—"Not to be loaded with glass."

"*F*" *Label.*—"*Keep far apart* from textile fabrics and paper packages."

Tank Wagons

The use of tank wagons has greatly increased in recent years, both for rail and road transport, of liquid chemicals, and to meet the case of transits where either sender or consignee has no siding, the railway companies have adopted the "demountable" tank, which can be loaded on a trailer, taken to the railway station and placed on a special truck, hauled by rail to destination station and then placed on a trailer and hauled to any point desired, thus competing with the road tank.

The road tank, however, can often perform three journeys of 200 miles each way against one rail tank journey, in a week, whilst for shorter distances the disparity in use is greater, so that where the traffic is sufficiently heavy to keep road tanks fully employed, their use is generally preferred, particularly for products which have a high rail classification. For rail transit in tank wagons the net weight of contents only is charged for, and the empty tanks are conveyed back to the sending point free of charge.

When drums, casks, or carboys are used, the rail charges are based on the gross weight, and the empty packages have also to be paid for on the return journey. Therefore, every effort is made to use tanks where quantities warrant this, in order to minimise transport costs. When carboys are used, they may pass by rail in full truck loads, packed in hampers, but for less than truck loads they must be packed in flat bottomed crates, in addition to the hampers, except where they can be effectively boarded off from other goods in the trucks, and packed so that they cannot overturn.

For passenger train transit, many chemicals are accepted for conveyance in comparatively small quantities only, whilst some are not accepted at all, except as "samples," which, for solids, must not exceed 1 lb. and for liquids 1 pint per consignment.

With regard to rail transit generally, there has been a tendency on the part of the railway companies to classify chemical products which are inflammable, corrosive or poisonous, more highly than those which do not possess these properties, whilst at the same time imposing packing conditions which provide adequate protection against the risks incidental to the nature of the goods. The cost of such special packages is relatively high, and their use often means an increase in gross weight conveyed, so that to add to these essential burdens an increase in cost of conveyance per ton gross weight does not seem at all reasonable, and in those cases where the packages necessary are substantially heavier than the normal package, per ton of product, it would seem only fair to grant lower ratings to compensate the disadvantages suffered.

The advent of road transport has, to a considerable extent, afforded relief from the disability named, as road rates are usually based on loading capacity rather than on the nature or value of the products conveyed.

Unsaturated Organic Acids

Substitutes for Tung Oil in Varnishes

PREVIOUSLY Drinberg and Blagoronova (*Promychlenost organicheskoj khimii* 1937, *4,* 114-117) have reported about synthetic esters giving films with equal properties to those prepared with tung oil. The more interesting of these esters are pentaerythritol ester of fatty acids of linseed oil ("pentol"), pentaerythritol "dikol" (polymerised composition of one part of the ester and one part of linseed oil), polyglycerol ester of linseed oil fatty acid, and "klupanodol" (glycerol ester of clupanodonic acid).

In further studying the effects, investigations were made using the following vegetable oils : tung oil, crude and polymerised linseed oil, a mixture of 1 part of linseed oil and 2 parts of tung oil ("tung oil dikol"), and "dikol" (consisting of 2 parts of linseed oil and 1 part of tung oil, polymerised for one hour at 290 to 300°). The relative viscosity of the polymerised product (with regard to crude linseed oil) was 182. With regard to the drying capacity pentol, pentol-dikol, and klupanodol correspond to tung oil and dikol. The films were prepared with cobalt siccative (0.119 per cent. Co).

The results showed that the hardness of films prepared with either esters of crude or polymerised linseed oil is almost equal at the beginning of the drying process; after a time the hardness of polymerised oil is less than that of crude oil, and finally the hardness is again equal. The hardness of tung oil films is considerably increased during the first six days; after this time it shows the same hardness as linseed oil film. The hardness of pentaerythrit seems to attain a constant value after 200 days. Contrary to tung oil films the hardness of pentaerythrit films is altered neither during the first period nor during the ageing period. The mechanical properties of the films rise with increasing viscosity.

Tests showed further that the water resistance of linseed oil and of klupanodol films is the highest, and of pentaerythrit and of pentol films the lowest. Pentol and its dikol have the lowest swelling resistance. Though pentol films possess the greatest hardness their elasticity is also the greatest. The author recommends the use of the pentaerythritol ester of linseed oil fatty acids (pentol), and its mixture with linseed oil (dikol) as a substitute for tung oil. Varnishes prepared from pentaerythritol esters, after being used for two years as inner coatings, showed no remarkable changes. The esters can also be used in pigmented form.

Wooden Barrels and Kegs

By

A. G. S. PARKER

THE question of a suitable type of container for a particular product is often a matter of considerable importance to manufacturers and a word or two about the various types of wooden barrels and kegs may be of interest.

The Bulge Barrel

The first and commonest type which comes to mind is the bulge barrel. It has been said that this type of cask was known in the time of King Solomon, but while this may or may not be historically correct there is little doubt that the bulge barrel is the oldest type of cask still in use. It is constructed of specially shaped staves usually of oak or other hardwood, in certain instances tongued and grooved, secured by iron hoops, and is used principally for wet products. The growing practice of transporting liquids in "tankers," both by land and sea, is considerably restricting its use, however, in addition to which it is being replaced to an increasing extent by metal drums of various kinds. But, nevertheless, apart from its use for wet products, the bulge cask is still used to a considerable extent for copper sulphate and similar products, especially when transported in fairly large bulk or in heavy weights. It is still undoubtedly the strongest type of wooden cask obtainable.

Guelph type cask made of hardwood veneer staves. It is suitable as a non-returnable container for dry and semi-liquid products.

In addition to the hardwood type there are other types in use made of fir or softwood timbers. These, however, are mainly apple and grape barrels, etc., which with other re-coopered casks, are used for cheap chemical products which will not stand the cost of a new or expensive packing. A very recent development in the bulge type of cask is one in which the staves are replaced by shaped veneers placed in a glueing press and glued together in barrel shape by means of air pressure and heat. The heads are sprung in and held in position with iron bands. The resulting barrel is claimed to be leak-proof and considerably lighter than the ordinary type of bulge cask, but it remains to be seen whether or not it will prove a commercial proposition.

The Cylindrical Cask

Another type is the cylindrical cask. This does not compete with the bulge barrel for the transport of wet products or for heavy weights or large bulk, but is mainly suitable as a non-returnable container for dry and semi-liquid products. In the type of cylindrical cask which first appeared in this country just sixty years ago and which is still extensively used in the chemical industry, the construction is of layers of hardwood veneer staves bound into a cylinder with wooden outer hoops, the joints of one layer being covered by the staves of the other and *vice versa*. Owing to the fact that the number of layers of veneer and also their thicknesses can be varied, as well as the number and thickness of the outer hoops, a wide range of varying strengths can be produced. In addition a range of varying heights in different diameters enables any given capacity to be supplied from 300 to 13,000 cubic inches, thus avoiding waste space. Two- and three-piece heads of deal or one-piece heads of plywood are supplied, the former being sprung in and therefore, generally speaking, tighter fitting. On the other hand, however, the plywood heads are usually fitted with a lifting ring and are easily removed or replaced.

Cylindrical Cask Made Entirely of Plywood

A second type of cylindrical cask is that made entirely of plywood. In this case a sheet of plywood is bent into a cylinder and the butt joint edges are secured either by riveting to an inner strip of plywood or to an outer strip of metal. The latter process is more expensive, but leaves the inside of the cylinder entirely free from any obstruction. These kegs are usually provided with two or more plywood outer hoops, although for very light and very cheap products, the hoops may be dispensed with altogether. In larger size kegs or where necessary for purposes of economy, two or more pieces may be used to form the cylinder. Stitches of coppered wire are sometimes used in place of rivets, but the latter would appear to give a stronger joint.

A plywood keg made by the Guelph Cask, Veneer and Plywood Co., Ltd. It is constructed by bending a plywood sheet into a cylinder and securing the butt jointed edges.

In the early days of the plywood keg, the type of plywood obtainable at an economic price was of a decidedly inferior quality. With the passing of time, however, the quality of plywood has improved, while at the same time the price has fallen, owing largely to the competition for the British market between Russia and Finland. At one period plywood prices were at a ridiculously low level, and although this position no longer obtains to the same extent, plywood kegs are still obtainable at comparatively cheap prices. They, too, offer a fairly wide range of strengths as the thickness of the plywood used for the cylinder can be varied, also the number and thickness of the outer hoops. A similar range of capacities is also available. In spite of their comparative cheapness, plywood kegs are, generally speaking, of good appearance, but there is a rather unpleasant odour associated with plywood, which is especially noticeable after a plywood keg has been closed for any length of time. In the case of numerous products this odour is, of course, of no consequence, but in the case of foodstuffs, or chemicals intended for use in their manufacture, it is a definite drawback.

Linings for Casks

In connection with cylindrical casks numerous types of linings can be supplied, suitable for the various products to be packed. These linings include, among others, bags of grease-proof, parchment, blue and kraft papers, linings of strawboard and waterproof paper and tin linings.

It will thus be seen that a wide variety of sizes, strengths and types of wooden containers is available to manufacturers according to the particular purpose and product for which the container is required.

Apart from the weight and bulk of the product there are certain other considerations involved. For example, a light keg which would satisfactorily carry a given weight by lorry direct from manufacturer to customer would not be suitable for carrying a similar weight on a long journey abroad on account of the frequent and often rough intermediate handling which it would receive, probably resulting in loss or spoilage of the contents. Fortunately chemical manufacturers need not concern themselves unduly with these and similar details as there exist several well known and long established cask making concerns which are prepared to place their wide experience at the disposal of inquirers. By acting on their advice, manufacturers can be sure of obtaining the right cask for the particular purpose both as regards size and strength and thus ensure perfect delivery of their product to their own and their customers' satisfaction.

Timber Research

Progress in the Research Programme of the Forest Products Research Laboratory

THE report of the Forest Products Research Board for the year 1937, which has been issued by the Department of Scientific and Industrial Research (H.M. Stationery Office, 2s.), summarises the progress which has been made during the year in the various branches of research included in the programme of the Forest Products Research Laboratory. The following extracts from the report are concerned with those investigations at the Laboratory of a more chemical nature.

A method of testing the moisture-resisting qualities of paints on wood has been developed and consists of exposing pairs of matched panels of beech to standard humidity changes. One of the panels is painted and the other is left uncoated, and the efficiency of the coating is assessed by comparing the moisture content changes in the treated and untreated panels. The efficiency is recorded after exposure periods of seven, fourteen and twenty-eight days. With gloss oil paint, the efficiencies for these periods were 85, 75 and 60 per cent. with one coat, and 95, 92 and 86 per cent. with two applications. Values of the same order have been obtained with heavy bituminous paint. The low moisture-resisting value of boiled oil has been pointed out by many experimenters, but this fact does not seem to be sufficiently well known to the trade at large.

The beneficial effect of the second coat was indicated by tests with aluminium paste in a spar varnish medium. The seven-day efficiency of one coat was 25 per cent., whereas the corresponding figure for two coats was over 75 per cent.

Fire-Resistance of Timber

Wood being an organic material cannot be rendered completely "fire-proof" but by impregnation with various chemicals it can be rendered "fire-resistant" in that it will not flame or glow under the influence of heat, but will merely char, and so will not assist the propagation of fire. The action of the compounds which have this effect has generally been assumed to be as follows:—

(1) The compound melts at a temperature below that at which the timber would normally burn, and forms a glaze preventing access of oxygen to the wood.

(2) The compound decomposes under the influence of heat yielding inert vapours or gases which dilute the combustible gaseous products of the wood to such an extent as to render the mixture non-inflammable.

(3) Under the influence of heat the compound vaporises or dissociates with sufficiently large absorption of heat to prevent the temperature of the wood rising high enough for it to decompose.

There is no doubt that all these phenomena may contribute to the effect of a fire-proofing compound, but from general observation during the testing of such compounds it was considered that they did not completely account for the whole of the fire-proofing effect.

It was noted during these tests that a harder, denser charcoal was formed from treated material than that from the untreated material. It is known that in carbonising wood the yield of charcoal can be increased by the addition of certain chemicals and it was thought that this same action might be responsible for a fire-resisting effect. A series of experiments based on this supposition was carried out to determine the effect of a number of chemicals on the yield of charcoal during carbonisation. It was found that several chemicals increased the charcoal yield by as much as 100 per cent. and that all the chemicals which had this property were known to be capable of increasing the fire-resistance of timber, whereas those which did not increase the yield of charcoal were of the type known to have very little fire-retarding effect. The increase in charcoal yield must be at the expense of the inflammable volatile products of distillation, and it is reasonable to assume that this effect is the major action of a fire-proofing compound. The other factors such as the evolution of inert gas, formation of glaze, and absorption of heat no doubt also play a part, but only to a minor extent.

Examination of the salts which have the effect of increasing the charcoal yield revealed that they were all of the type which decompose under the influence of heat with the formation of the acid from which the salt is derived. The stable salts had very little effect. At first borax, which is an effective salt and is also stable under ordinary conditions, was thought to be an exception, but there is definite evidence that borax heated in the presence of methyl alcohol (one of the products of wood carbonisation) dissociates, yielding the free acid.

In the report for 1936 it was recorded that oak sapwood immersed for five minutes in a 20 per cent. solution of a chlorinated naphthaline wax in benzene and exposed two months later to *Lyctus* beetles was not attacked by these insects. Further tests have shown that such a treatment will prevent infestation by *Lyctus* for at least nine months. Samples treated with a mixture of one part creosote and two parts paraffin have resisted *Lyctus* for 11 months after treatment, but this preservative has the disadvantage of discolouring the timber. A further series of experiments with a 5 per cent. aqueous solution of potassium chromate as preservative has been started, using a wider range of absorptions.

The Hemicelluloses of Oak Wood

The research on the hemicelluloses of oak wood (fractionation of hemicelluloses) has been continued with the following results. The fraction of hemicellulose A (from both sapwood and heartwood) which is insoluble in water at 100° C. has been further fractionated by digestion with the enzyme takadiastase under carefully controlled conditions into an insoluble polysaccharide, a soluble polysaccharide and the reducing sugar glucose. The most important result of this further fractionation has been that the polysaccharide which is not brought into solution during digestion with the

enzyme has a specific rotation of —97.5° in every case. This result, in conjunction with certain analytical evidence, suggests that there is a polysaccharide fraction which is common to the hemicellulose A of both the sapwood and heartwood of oak.

In addition to wood starch, at least two other water-soluble polysaccharides which are related to starch are known to occur in oak sapwood. It has been found that all of these related bodies, as well as a number of oak hemicellulose preparations, contain uronic anhydride groups. The chief fundamental significance of the uronic anhydride group is that it may represent a stage in the synthesis within the tree of certain major components, notably the hemicelluloses and lignin.

Action of Certain Oxidising Agents on Wood

It is well known that, at high concentrations, hydrogen peroxide causes a rapid decomposition of wood. In the presence of alkali and at comparatively low concentrations, however, this reagent has a bleaching action which is finding an increasing application commercially. The early work of Marggraf (*Kunststoffe*, 1917, *7*, 165) has been extended and detailed analyses have been made on both light- and dark-coloured woods before and after bleaching under various conditions. The results indicate that hydrogen peroxide (20 vols.) in the presence of ammonia can effect bleaching in a large number of woods, irrespective of their initial moisture content or colour. Bleaching for periods up to 24 hours at room temperature results in the removal of minor components and the decomposition of part of the lignin. Prolonged bleaching ultimately leads to the decomposition of the wood cellulose. From the practical standpoint it is clear that a considerable degree of surface bleaching of wood in the piece by means of hydrogen peroxide and ammonia can be achieved without risk of serious chemical disintegration. Further the final colour of the bleached material is reasonably permanent, provided drying is carried out at temperatures not exceeding 40° C.

When certain woods are warmed in the presence of a concentrated solution of potassium permanganate, a spontaneous and vigorous decomposition of the wood substance ensues. Analyses indicate that this reagent has the same order of chemical effect on wood as alkaline hydrogen peroxide, but no bleaching effect is produced.

Survey of Laminated Wood Products

Recent developments in the investigations of synthetic resins have led to their wide use as adhesives and impregnating media and in the surface treatment of wood, and many of the defects and failures inherent in laminated wood have thereby been eliminated. Their resistance to bacterial action, fungus and mould, combined with their high strength values, moisture and heat-resisting properties and stability, have conferred on composite wood properties hitherto unattained with any form of adhesive, thus considerably increasing the scope of its utility in laminated forms of construction, particularly such as are used in the manufacture of aircraft.

Similar developments in the manufacture and use of compressed laminated wood, in which varying degrees of compression and impregnation with synthetic resin solutions are used to render the finished material suitable for special purposes, have added further interest to this class of product. They are being investigated, and already some tests have been carried out. A collection of the various types of composite wood products, including compressed and impregnated wood, and combinations of wood veneers with metal, asbestos, fabric and bakelite, has been made.

Adhesives of the glyptol-resin and latex-casein type allow of sufficient flexibility of the glue layer to overcome the difficulty arising from marked variations in the coefficient of expansion in other types of binding material. As the result of contact with the Research Association of British Rubber Manufacturers veneer has been supplied to them for tests of the suitability of rubber shellac composition as a bonding material for laminated wood. The moisture-resisting and insulating properties as an adhesive are of special interest.

Parallel with the use of synthetic resins as impregnating media, their employment as finishing materials in lacquer and paint form for wood has made equally rapid strides.

Advisory Work

There has been a marked increase in the number of inquiries received on the subject of charcoal and charcoal manufacture, particularly as regards portable steel retorts. The manufacture of charcoal by this method may still be said to be in the experimental stage, and systematic investigation into carbonisation technique and the quality of the resulting charcoal appears to be necessary.

Assisting Industry in India

Development under Consideration

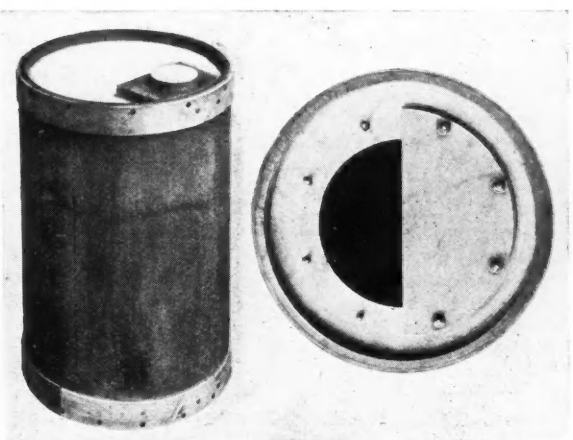
RESEARCH and development work on vegetable and essential oils, the improvement of glass pot furnaces, and the possibility of manufacturing synthetic resins of the bakelite type are some of the subjects to be discussed by the Indian Industrial Research Council at Madras very shortly.

The research branch of the Government Test House, Alipore, has been carrying out investigations to test whether it is possible to utilise vegetable oils in internal combustion engines, on glass and glass-making materials, paints, electric lamps, and other subjects. The progress of these will be reported by the research officer of that establishment to the Council.

The improvement of glass pot furnaces suitable for use in the Indian glass industry has been the special concern of the Council, and the developments which have taken place in connection with the improved type of furnaces installed, and put into operation under the supervision of the Industrial Research Bureau in the Star Glass Works at Ferozabad will be considered.

Other materials which will be discussed from the point of view of manufacture in India, are cellulose substances required for artificial silk manufacture, casein and synthetic resins of the bakelite type. The co-ordination of the industrial research work of the Universities and scientific institutions with the work of the Council will also be considered.

A NEW STYLE PLYWOOD KEG



A new style of plywood keg recently placed on the market by W. Lusty and Sons, Ltd. It is fitted with a cork bung and is used for the packing of certain liquid chemicals. An alternative type of opening for this keg is shown on the right, where a larger aperture is preferred for filling purposes and where cleaning of the interior is necessary.

Some Aspects of British Chemical Industry

Special Messages for Our 1,000th Issue

A Brief Retrospect and a Problem

Since the publication of the first number of THE CHEMICAL AGE much has been done by the State and by private benefactions to encourage technical education and research; the supply of trained chemists has greatly increased, and on the whole has been well absorbed in industry and in other branches of practice. The establishment, during the war, of the Department of Scientific and Industrial Research, has been fully justified by the results achieved in the general development of scientific method and efficiency. The remarkable progress of discovery and invention during the past quarter of a century appears to alarm even some who themselves have made conspicuous contributions to it; yet the experience of the past should prove that it is but a stage in the education of humanity, to cope with which successive generations must endeavour to develop the necessary practical wisdom.

On the other hand, Jeremiahs here and there are heard deploring the scarcity of men of real ability and the unsatisfactory state of British chemistry. While doing little or nothing in the matter themselves, they find amusement in attacking those who are devoted to the best interests of the science and the profession. The fact is that there are as good British chemists as ever there were—indeed, some better—and the profession stands in a higher position than ever before in the affairs of men. Like other professions, it has its problems and these are generally known.

During the period under review the professional organisations and scientific societies, by their friendly co-operation in joint meetings throughout the country, have provided the means for the intimate exchange of views among their respective members, to their mutual advantage. In chemistry, as in medicine, however, the extension of knowledge has intensified specialisation, on which, in the long run, progress mainly depends. Then, each specialisation has demanded its own arena, and the profession has become further sectionalised, with the inevitable formation of new societies devoted to various branches of study and practice. This state of affairs has undoubtedly affected the interests of the older societies—the Chemical Society and the Society of Chemical Industry—which have so long been devoted to the more general aspects of the science and industry; so that, in recent times, the membership of these societies has not increased in proportion to the increase in the number of chemists, and they have recently found difficulty in meeting the cost of publishing the rapidly growing bulk of new matter. To deal with this difficulty, the Institute of Chemistry, the membership of which has steadily increased, has joined with the societies in the formation of a Chemical Council, including representatives of industry appointed by the Association of British Chemical Manufacturers, to establish and administer a fund to provide for the publication of new knowledge and the maintenance of the library of the Chemical Society, to which latter object other societies also contribute, receiving in return the privilege of the use of the library for their members.

The Chemical Council has so far been successful that it has received in donations and promises a sum of over £50,000 for the prescribed purposes. Of this sum, about £28,000 will be contributed, for immediate needs, by members of the Association of British Chemical Manufacturers, in the hope that, in the next few years, the finances of the publishing societies may be placed on a sound basis. It should be remarked, however, that, while the chemical industry and many chemists individually have responded generously to the appeal, many other industries which are dependent in some measure on the applications of science have, with a few notable exceptions, failed to recognise the very reasonable claim for their consideration.

For the present, the crux of the problem, to which the Chemical Council seeks a solution, is to devise means, agreeable to all concerned, whereby the membership and, therefore, the subscription revenue of the publishing societies, may be progressively assured to meet their future requirements.

From RICHARD B. PILCHER, Registrar and Secretary, The Institute of Chemistry; Hon. Secretary, The Chemical Council.

The Need for Development and Research

The best insurance policy for the future of an industry is research; hundreds are working to-day to create new things where before we had tens. A catch phrase, yes, but nowhere more true than in chemical industry. Elsewhere research is still in its adolescence; in our industry it dates from the days when Hofmann went back to Berlin. Economists may smile at five year plans towards national self-sufficiency, but they give an opportunity and an urge to the chemist as never before, freeing him, albeit momentarily, from the need to meet the query, does it pay?

The question may fairly be asked, are we in Britain sheltering too much behind the defences afforded by "safeguarding" and tariffs? Are we more concerned to fill the gaps in British made lists of chemicals than to strike out on our own? It may be a proper thing to do to-day from the point of the balance-sheet, but does it not also mean that we are going to be content to follow rather than to lead. Are our firms making enough use of outside help in this direction? These are some of the questions I would fain propound: it is certain there is need for unceasing development and research.

From DR. E. F. ARMSTRONG, F.R.S.

Technical Men in Control

Our educational systems turn out large, in fact too large, numbers of young technical men, whose encyclopædic knowledge astonishes older people. But other countries, especially America, are producing just as good men. But in this country technical industries do not advance as they ought, because they are controlled by what are known as executive or business men who have no qualifications for doing anything in particular. In America, I believe, industries are often in the hands of men who understand them; and clever technologists are able to command good salaries, and to develop industries step by step with the particular sciences on which they depend.

From SIR JAMES SWINBURNE, F.R.S.

Foreign Chemical Notes

Jugoslavia

A FACTORY FOR CASTOR OIL PRODUCTION is to be built by the Agricultural Banking Co., of Agram, at Banatski Despotovac.

France

PLANS FOR THE CONSTRUCTION of a 450 kilometre underground pipeline to transport petrol from Donges, on the Atlantic coast, to Montargis, viâ the Loire Valley, have been prepared by the Comité des Carburants. The estimated cost of 150 million francs would be met by a grant from the public works fund of the government.

Hungary

AN AGREEMENT HAS BEEN REACHED between the European Gas and Electric Company as a result of which a company will be formed to export the recent petroleum finds and the government will be guaranteed a 15 per cent. share in the value of the output.

Oil in Great Britain

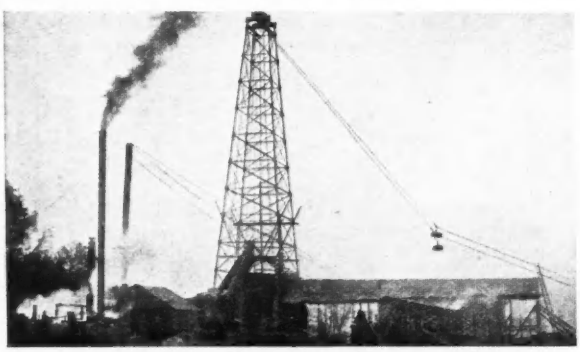
Endeavours to find oil in Great Britain made during and shortly after the war provide an interesting comparison with the present activity in this direction, particularly in view of the promising "strike" at Dalkeith. The first issue of THE CHEMICAL AGE *(June 21, 1919), contained an article, of which the following extracts describe some of the results obtained at that time.*

"THE oil-boring experiments now going on in Derbyshire are, of course, of great interest, but on the results obtained up to the present it would be foolish to base extravagant expectations.

"In all, eleven drilling sites have been selected—seven in Derbyshire, two in North Staffordshire, and two in the Midlothian district of Scotland. The sites for all of these wells have been selected after very careful geological research, for the purpose of testing those geological structures which are regarded as being the most favourable for the conservation of any petroleum which may exist."

Regarding the wells in Derbyshire, Renishaw Well, one mile south of the village of Eckington, "was 'spudded in' on January 18, 1919, and by February 6 a depth of 530 ft. had been reached. The 15½ in. casing was set at this depth and cemented to protect the deep, hard coal seam which was passed through. The 12½ in. casing was landed at 599 ft., the water being effectively shut off down to this depth. A sand with dry gas was passed through at 1,610 ft., followed by another sand containing wet gas. At this horizon a very slight show of oil was noted. As water was encountered below the gas, the 10 in. casing was run to 1,785 ft. and the gas and water successfuly muddled off. The present depth of the well is 2,950 ft."

Brimington Well, was in the recreation ground belonging to the Brimington Parish Council, half a mile south of the village. "At this well, where drilling was commenced on November 29, 1918, water was encountered, with the result that the 15½ in. casing was set and cemented at a depth of 222 ft. Drilling was resumed on January 2, and at 1,030 ft. a sandstone, apparently the rough rock of the millstone grit, which also contained water, was drilled into. As the drilling progressed to 1,070 ft., sufficient gas began to appear to make the water flow over the top of the casing. The well was carried to 1,106 ft., when it was considered necessary to mud off the water and gas. Some delay resulted, but this work was successfully accomplished and drilling was resumed on March 17. At a depth of 1,285 ft. the gas pressure caused the collapse of a portion of the 12½ in. casing. A little gas and a trace of oil was noted in the Chatsworth grits at 1,430 ft. The 10 in. casing was set at 1,785 ft. The grit beds



A view of the Hardstoft well in operation.

of the millstone grits appear to be normally developed, and the well has now reached a depth of 2,625 ft."

At Hardstoft Well, on Biggan Farm, near Hardstoft, one mile north of the village of Tibshelf, drilling operations "were officially started by the Marquis of Hartington on October 15, 1918. At a depth of 527 ft. the 15½ in. casing was cemented in order to protect the coal seams which had been penetrated. On resumption of drilling the 12½ in. casing was carried to 1,036 ft., at which depth it was cemented to protect the Kilburn coal seam. The strata passed through consisted of sandstones and shales, and the usual coal seams common to the district. The Wingfield sandstone occurred at 900-990 ft., consisting of alternations of sandstone and shale with salt

The first flow of oil from the Hardstoft well on May 27, 1919.

water. From 1,400-1,513 ft. alternations of sandstone and shale, with water, a little gas and a slight show of oil were encountered, and at a depth of 3,377 ft. oil was met with. It is impossible to make a definite statement as to the exact geological horizon at which the oil was found until the well has been carried deeper and further samples of the strata obtained. The oil-bearing horizon had been penetrated only a few inches when operations were suspended to repair the calf wheel of the derrick and to take suitable precautions for dealing with the oil. The oil at present is flowing into the borehole at the rate of about 350 ft. per day, and a column of oil now stands in the borehole to a height of 2,500 ft.

"Sites for two wells have been selected in the Midlothian district: (1) D'Arcy, situated about three miles south-east of Dalkeith, and (2) West Calder, close to the village of West Calder. Drilling has not actually commenced at these boreholes, although the work of rigging up at West Calder is well advanced. As is well known, Messrs. Pearson & Son, Ltd., have during the past few years carried out extensive investigations into the oil possibilities of Great Britain, and have placed at the disposal of the Government the results of these investigations, together with the experience and assistance of their technical staff. The results so far attained at Hardstoft have been very largely due to the technical work carried out by Dr. A. C. Veatch, Lord Cowdray's chief geologist, who has been assisted by Mr. Crandall and Mr. Ickes. The chemical investigation carried out by Mr. J. E. Hackford, chemist to Messrs. Pearson, has added materially to the evidence which led to the test of the drill.

"A sample of the oil from Hardstoft was analysed by the late Sir Boverton Redwood, the Director of Technical Investigations, H.M. Petroleum Executive, who submitted the following report:—

"General Character.—A limpid oil of dark brown colour by transmitted light, but exhibiting strongly-marked green

fluorescence by reflected light, and of characteristic odour. The oil contained only a trace of water.

Specific Gravity at 60° F.	0.828
Flash Point (Abel Test)	73°F.
Distilling below 150° C. (Petroleum spirit)	4.5% (By volume.)
Distilling between 150° C. and 300° C. (Petroleum lamp-oil or kerosene)	41.0%
Specific Gravity at 60° F.	0.783
Flash Point (close test)	105°F.

Residue ceases to flow at 45° F., owing to the presence of solid hydrocarbons (paraffin).

"A further analysis has been made by Mr. J. E. Hackford indicating the commercial products obtainable from the oil :—

Motor Spirit	7½%
Kerosene (lamp oil)	39%
Gas Oil (basis of fuel oils)	20%
Lubricating Oils	30.5%
Paraffin Wax	3%
Sulphur	0.26%
Specific Gravity	0.823
Setting Point	0°F.
Viscosity (at 100° F. Redwood)	48 secs.
Chemical Characteristics	Paraffin base containing naphthenes.

"A licence, dated May 12th, has been granted by the Minister of Munitions to Oilfields of England, Ltd., Worcester House, Walbrook, to bore for petroleum near Newark, in the County of Nottingham. This licence, which is to run for two years, provides that within six months the licensee shall proceed to search and bore for petroleum, and reserves to the Government the right of acquiring the working and plant at a price to be determined in default of agreement by arbitration."

Chemical Trade in the Belgian Congo

Increased Demand for Chemicals and Allied Products

DEPENDENT entirely upon exports and chiefly upon mineral exports for its economic development, the Belgian Congo in 1937 made remarkable progress and the demand for chemicals and allied products expanded considerably, according to a report of the American Consulate at Leopoldville. Stimulated by the high prices of 1936, production in practically every branch of economic activity expanded and exports of the principal commodities rose to the highest figures in the colony's history.

Increased operations of the mining industry, principal consumer of production goods in the colony, created a substantially larger demand for industrial chemicals and explosives in 1937 than in the preceding year and aided in stimulating increased consumption of other goods. The rise in consumption of paints and varnishes, perfumery and cosmetics, and most other products allied to chemicals, was, however, caused chiefly by a larger demand by the white or European population which increased 16 per cent.; the demand for practically all types of consumption goods, except the simplest of necessities, is limited to the non-native residents. Consumption of textile dyes and colours rose in 1937 as a result of greater purchasing power and consequently a larger demand for cotton piece goods by the 11,000,000 natives.

Sharing in the general improvement of the colony's economic situation, imports of practically all types of chemicals and allied products advanced to a total of 36,700,000 francs in the first 9 months of 1937, despite the increased output of the colonial industries manufacturing some similar commodities. Industrial chemicals, medicinals, paints and varnishes, toilet preparations and matches all rose substantially in 1937, imports of such commodities during the first 9 months, the latest period for which statistics are available, having exceeded those for the full year of 1936.

The domestic chemical industry is dependent principally for its creation and existence upon the copper refining industry in the Katanga area. The only concern manufacturing chemicals exclusively, Sogechim, was created by a syndicate of Belgian firms in which the Union Miniere du Haut-Katanga played a leading role. Completing two factories in 1926 for the refining of copper, the Union Miniere du Haut-Katanga, which is the principal radium and one of the largest copper producers in the world as well as being an important extractor of tin, gold, silver, cobalt, palladium and platinum, needed substantial supplies of heavy chemicals and the chemical firm was formed. Sogechim expanded its facilities in 1937 and a factory for the manufacture of sodium chlorate was completed, and an installation for the manufacture of sulphuric acid made. Output by the firm in 1937 in metric tons was: sulphuric acid 11,650, glycerine 60, sodium chlorate 210, copper sulphate 11, and fertilisers 325.

The Compagnie Chantier Naval et Industrial du Congo, produced 4,819 cubic metres of acetylene using imported calcium carbide in the process, and 41,815 cubic metres of oxygen in 1937. A cement manufacturer has a calcium carbide plant with a daily capacity of 3 tons, but in 1937 the firm produced only 46 tons for local consumption.

In 1936, the latest year for which statistics giving the sources of chemicals and allied products imported, are available, Belgium supplied the colony with about 70 per cent. of the total imports of chemicals and allied products other than sulphur and toilet preparations.

NEW TYPE ALUMINIUM DRUM

A new type aluminium drum, complete with cast aluminium rolled thread stopper for use in the dyestuffs industry, recently produced by the London Aluminium Co., Ltd. The drum is spun in halves, the halves being lapped and welded in the centre. It is available in 5 and 10-gallon sizes and can be supplied with a frosted finish. The drums are also made in sizes ranging from 5 to 160 fl. ozs. in a one-piece spinning.

The British Association Meeting

Discussions on Clays and the Repercussions of Synthetic Organic Chemistry on Biology and Medicine

THE British Association meeting at Cambridge (see last week's issue, pages 135-9) was continued on Monday with a discussion on Clays under the chairmanship of Professor E. K. Rideal, F.R.S.

Professor W. L. BRAGG, F.R.S., dealt with general features of the atomic structure of silicates, inferences being drawn from them as to the structure of clay minerals. The minerals found in clay are often of very variable chemical constitution, and are imperfectly crystallised. The evidence as to atomic pattern given by X-ray diffraction is meagre and difficult to interpret. It is, therefore, necessary to supplement it by making use of all the knowledge we have about the grouping of atoms in silicates in general, which has been obtained by studying well-crystallised types.

The silicon-oxygen framework of a silicate, composed of tetrahedral groups linked by their corners, is so rigid and strong that it determines the form of the whole structure. In most, if not all, clay structures, the framework takes the form of sheets of tetrahedra linked by their bases. Such sheets may either be directly superimposed in the mineral, or be separated by intermediate layers containing ions, or water molecules. The physical chemistry of the clays is bound up with the attachment to the sheets, or detachment from the sheets, of ions and molecules.

The structure and properties of imperfectly crystallised clay minerals were described by Dr. G. NAGELSCHMIDT. According to their power to diffract X-rays two groups of clay minerals can be distinguished. The minerals of the first group show more perfect crystallisation and give better developed powder diagrams than the minerals of the second group. The first group includes kaolinite and pyrophyllite, and the second group halloysite and montmorillonite. The atomic arrangements in the second group are mainly derived by analogies and require further confirmation.

The Hydroxyl Bond in Clay Minerals

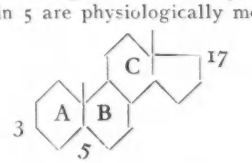
The hydroxyl bond in clay minerals was discussed by Professor J. D. BERNAL, F.R.S. The essential process that takes place in the formation of clays from rock minerals such as felspar or mica is hydration. In the first stages, however, water does not form part of the clay as such, but as hydroxyl groups bound to magnesium, aluminium, or more rarely silicon ions. A hydroxyl group bound to one of these ions is capable of attaching itself to other hydroxyl or oxygen atoms in neighbouring layers owing to the polarising power of the hydrogen it contains. The strength of the hydroxyl bond thus formed depends on the charge of the ion to which the oxygen atoms are attached. It is strongest for a silicon, weakest for a magnesium ion, and this is also the order of the capacity to lose the hydrogen ion altogether or the order of decreasing acidity of the clay particle. In greater degrees of hydration water molecules are bound to the hydroxyl group, but in a way which resembles the structure of ice more than it does that of free water, owing to the directing effect of the hydroxyls.

On Tuesday Section B held a discussion on repercussions of synthetic organic chemistry on biology and medicine, introduced by Professor Sir F. GOWLAND HOPKINS, F.R.S.

Professor E. C. DODDS dealt with synthetic œstrogenic compounds. The demonstration of the œstrogenic activity of simple molecules, bearing little or no relationship to the structure of the natural œstrogenic hormones, indicates that a complete change of view must be made on the question of the specificity of biological action. The work described shows that œstrogenic activity can be obtained by a whole series of different molecules without any apparent common physical or chemical property. The high degree of activity of 4 : 4′-dihydroxy-α : β-diethyl stilbene adds considerably more interest to this subject since this substance is several times more potent than the naturally occurring hormone. It would appear, therefore, that biological activity may be imitated by a whole series of substances, possibly quite foreign to the body. The bearing of this on the whole question of hormones and vitamins is of the greatest importance.

Constitution and Activity of Androstane Derivatives

Professor L. RUZICKA, discussing the relationship between chemical constitution and physiological activity of androstane derivatives, said that more than fifty androstane derivatives have been prepared and their growth-promoting action on the capon comb and on the auxiliary sex glands of the castrated rat have been investigated. The majority of these androstane derivatives can be classed together in one group, the members of which differ from one another only in the details in positions 3, 5 or 17 of the androstane nucleus. The physiological activity in both tests depends upon the nature of the substituents in these three positions and on their steric configuration. One of the possible two steric configurations is in each case more active physiologically and the physiological difference between compounds possessing these two configurations is greatest in the case of compounds differing in the 5-position, whereas position 17 has less influence and position 3 the least influence. With reference to position 5, that configuration is favoured physiologically which consists in a *trans* configuration of the rings A and B. The corresponding *cis* isomers are physiologically quite inactive. On carbon atom 17 the *trans* position of the hydroxyl with respect to the neighbouring methyl group leads to increased activity compared with the corresponding *cis* compounds, and on carbon atom 3 the isomers showing *cis* configuration of the hydroxyl with respect to the hydrogen in 5 are physiologically more active.



The introduction of a double bond in position 5 leads only to a slight alteration in physiological activity. Moreover the double bond does not appear to be intimately concerned with testosterone-like activity when compared with the corresponding saturated derivatives. Of importance, however, is the presence of a keto group in position 3 which, in respect to the action on the seminal vesicles and prostate, is greatly superior to the corresponding hydroxyl derivative. A reversed relationship appears to exist for carbon atom 17 where a hydroxy group is found to be more active than a keto group. An increased activity of testosterone when it is injected in oil solution can be obtained by esterification, especially the propionate shows remarkably enhanced activity.

Importance of Double Bond Position

It is established that a whole series of androstane derivatives show a weak œstrogenic activity. It is not possible to define the details of the chemical structure characteristic for this activity in such an exact way as it is possible to determine the structural details associated with androgenic activity. It seems, however, that the presence of a double bond in position 5 is of essential importance for the œstrogenic activity of androgens. For progesterone-like activity in androstane derivatives the double bond also appears to be necessary.

Dr. A. S. PARKES read a contribution on multiple biological activities of hormones and allied substances. He said that

the gonadal hormones and allied substances fall into three classes: the œsterone group, the progesterone group, and the androsterone-testosterone group.

Cancer-Producing Polycyclic Hydrocarbons

Professor J. W. COOK, F.R.S., discussed polycyclic hydrocarbons with cancer-producing action, pointing out that there is now a considerable group of polycyclic aromatic hydrocarbons which have the power of causing cancer. The disease so produced is indistinguishable in its characteristic from that which occurs in man. The chief classes of cancer-producing hydrocarbons are (*a*) those derived from 1 : 2-benzanthracene, and (*b*) 3 :4-benzphenanthrene and its derivatives.

The former class has been extensively investigated and it is now possible to state some of the factors of molecular structure which are associated with cancer-producing activity. The twelve monomethyl derivatives of 1 : 2-benzanthracene have been synthesised and tested, and the only ones which have shown definite carcinogenic action are those with the substituent at positions 10, 5, 9, 6 (this represents a decreasing order of efficiency). Further, if simple alkyl substituents are present in two favourable positions of substitution they reinforce one another so that more potent compounds result. Such compounds are the 5 :6-dimethyl and other 5 :6-substituted benzanthracenes (Cook), 5 :9-dimethyl-1 :2 benzanthracene (Newman) and 5 : 10-dimethyl-1 :2-benzanthracene (Fieser).

The most powerful carcinogenic agent so far known is 9 : 10-dimethyl-1 : 2-benzanthracene (Bachmann), which gives multiple tumours much more rapidly than any other compound tested.

Apart from 9 : 10-dimethyl-1 : 2-benzanthracene two of the most active cancer-producing compounds are 3 : 4-benzpyrene, a constituent of coal tar which is undoubtedly responsible for skin cancer among tar workers, and methylcholanthrene, which may be prepared in the laboratory from cholesterol and the bile acids. Both these hydrocarbons are benzanthracene derivatives with substituents at positions 9 (in the case of 3 : 4-benzpyrene) and 5, 6 and 10 (in the case of methylcholanthrene). 3 : 4-Benzphenanthrene has weak cancer-producing activity; its 2-methyl derivative is fairly potent, as is also 1 : 2 : 3 : 4-dibenzphenanthrene. The influence of substituents in other positions is being investigated (Hewett). Carcinogenic chemical compounds other than polycyclic hydrocarbons are also known.

Adrenal Cortical Hormones

Dr. T. REICHSTEIN dealt with the partial synthesis of compounds related to the adrenal cortical hormones. The suprarenal glands are essential to life and the total removal of these organs leads to death; each gland consists of two separate parts, the medulla and the cortex, the latter part of the organ being associated with the life-maintaining function. During 1929-30 it was shown that extracts of adrenal tissue could be prepared which on injection into adrenal-ectomised animals maintained life. It seemed, therefore, that the most important function of the adrenal cortex was the production of one or more hormones. Such extracts are now prepared in large quantities for clinical use. In several laboratories attempts have been made to isolate the "cortical hormone" in pure form, and as a result of this work more than fifteen different chemically pure substances have been separated all of which appear to be sterol derivatives.

Professor A. R. TODD, in a paper on vitamin B_1 and its synthetic analogues, said that the existence of an antineuritic factor (vitamin B_1, aneurin) has been known for almost forty years, but its isolation in a pure condition from rice polishings was only achieved in 1926. The vitamin, usually isolated as its crystalline chloride hydrochloride $C_{12}H_{18}ON_4SCl_2$ has been the subject of much chemical investigation leading to the elucidation of its structure and its complete synthesis, the latter being realised independently by German, American, and British workers. As a result of these syntheses the vitamin is now prepared commercially and has become available for clinical and nutritional purposes. With a view to determining the structural features necessary for vitamin activity a number of synthetic analogues have been prepared. The results of this work indicate a remarkable structural specificity, for, apart from alteration in the nature and position of the alkyl substituent on the pyrimidine nucleus, any change in the vitamin molecule destroys the physiological action almost completely. Although it is not yet possible to state with certainty the exact function of vitamin B_1 in plants and animals, it is clear that it plays an important rôle as part of an enzyme system in carbohydrate metabolism.

Carbon Disulphide

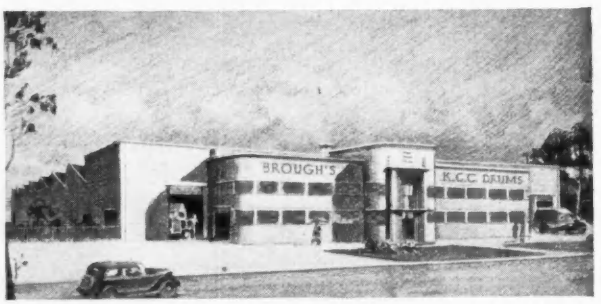
Products of Catalytic Hydrogenation

THE results of the catalytic hydrogenation of carbon disulphide are reported by Fischer and Koch (*Brennstoff Chemie*, 1938, *19*, 245). Hydrogenation both under atmospheric and elevated pressures was studied. Under atmospheric conditions, hydrogen was bubbled through carbon disulphide at such a temperature that the resulting gas mixture has a definite content of disulphide, usually 25 mol. per cent. (To obtain this ratio the temperature of the disulphide had to be 9-10°). The disulphide-hydrogen mixture was passed over a cobalt catalyst at temperatures from 70-350°. The usual streaming rate corresponded to the passage of 3 litres of hydrogen per hour. For pressure studies, temperatures of 190-300° were used, corresponding to pressures of 164-184 atmospheres. Molybdenum trioxide was used as a catalyst.

Practically complete decomposition of the carbon disulphide took place at atmospheric pressure at all temperatures above 250°. The chief products were methyl mercaptan and dimethyl sulphide and hydrogen sulphide. No methane formation occurred at 250°, but small quantities were produced at higher temperatures, especially when the rate of streaming and the hydrogen/disulphide ratio was high. Thus at 350°, when the H_2/CS_2 ratio was 5, and the rate of streaming was 16 litres of H_2 per hour, 20 per cent. of the disulphide was converted to methane. Under no circumstances was separation of carbon ever observed.

In the experiments under pressure, considerable amounts of methane were formed at all the temperatures studied, using a hydrogen/disulphide ratio of 3. When the disulphide was in considerable excess (e.g. $CS_2/H_2 = 2/1$), considerable amounts of complex organic sulphur compounds were found in the product, amongst which trithiolformaldehyde was observed in small quantities.

NEW DRUM WORKS of E. A. BROUGH & Co. Ltd.



Reproduction of architect's drawing of the large modern factory now being built for E. A. Brough and Co. Ltd. on a site of nearly 12 acres of land facing the L.M.S. railway at Speke, Liverpool. The new factory, which will employ about 300 workpeople, will be chiefly concerned with the manufacture of drums and similar containers.

Personal Notes

MR. REX IVAN TAYLOR, senior chemist at Crane Ltd., makers of tubes, valves, etc., Ipswich, was recently married at St. Augustine's Church, Ipswich, to Miss Constance May Brown.

MR. JOHN STANLEY PHILLIPS, managing director of Sutton and Phillips, manufacturing chemists, of Stowmarket, left estate of the gross value of £38,358, with net personalty £34,029.

MR. G. A. KNIGHT AND MR. C. A. PULLEY, both of University College, Nottingham, have been awarded the degree of Ph.D. in chemistry, by the University of London, in the examination for external students.

MR. ALFRED EDWARD WILLIAMS, a colour matcher employed by a firm at Stratford, London, has been awarded the silver cup of the City and Guilds of London Institute offered for the first time this year for the study of paint technology.

DR. G. T. O. MARTIN, who has been appointed by the Institute of Vitreous Enamellers, in collaboration with the

British Cast Iron Research Association, as Officer of Research to conduct investigations in connection with the application of vitreous enamel to cast and sheet iron.

PROFESSOR D. L. CHAPMAN, Fellow of Jesus College, Oxford, a former lecturer in chemistry at Manchester University, has been nominated to the committee establishing the new international and social relations division of the British Association.

SIR ALBERT SEWARD, the eminent botanist, has been elected president of the British Association for the meeting at Dundee next year. Sir Albert, who is 74, has, since 1936, been a member of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research. For 20 years he was professor of botany at Cambridge University and for two years—1924-26—was Vice-Chancellor of the University.

PROFESSOR ERNST FREUND, an authority on nutrition and food chemistry, has arrived in London with the object of continuing his research work in England. He is 74 years old, and has given his whole life to the quest for a chemical cure for cancer. Professor Freund is well-known to medical men throughout the world for his work at the Rudolf Hospital, Vienna. He retired from the post of director of the Research Institute at that hospital, when he reached the age limit of 60, and has since been working privately with the assistance of funds from Mr. Frederick Pearson, an American millionaire, who is greatly interested in this aspect of cancer research.

THE LATE MR. THOMAS EDWARD LESCHER, of Birkdale, managing director of Evans, Sons and Lescher Ltd., manufacturing chemists, Liverpool and London, left estate valued £15,871, with net personalty £14,153.

SIR FREDERICK GOWLAND HOPKINS, who has held the chair of biochemistry in the University of Cambridge since 1914, has intimated that he will retire next year. Sir Frederick, who is 77, is a Fellow of Trinity College, a pioneer of biochemistry studies in this country, Nobel Prize winner, and a past president of the British Association and the Royal Society.

OBITUARY

MR ALFRED HUTCHINSON, who was elected president of the Iron and Steel Industry last year, has died at Blackheath, London, at the age of 72. He had a very long association with the iron and steel trades on the N.E. coast as a director of the Skinningrove Iron Co., Ltd.

DR. EDWARD CHARLES EDGAR, principal of the Rutherford Technical College at Newcastle, died on August 20. Dr. Edgar took his doctorate in chemistry at the University of Manchester, where he served as lecturer from 1905 to 1919. He came to Newcastle in 1926, and his enthusiasm increased the number of students at the college from about 1,000 to 2,600. During the war period he was in the Explosives Department of the War Office, and immediately after the war he became an inspector of chemical factories in Germany. From 1919 to 1921 he was head of the office technical staff in the Production Control Department of the British Dyestuffs Corporation, and from 1922 to 1923 chief research assistant to the British Launderers' Research Association. In 1923 he became head of the Department of Chemistry at the Regent Street Polytechnic, London, a post which he retained until he went to Newcastle in 1926.

MR. ARTHUR PRATT, governing director of "Compo" Ltd., Dukinfield, a business which his father founded, has died at Deganwy, North Wales, at the age of 67. As a boy he entered the chemistry business as an apprentice with Mr. Stephen Sharp, of Stamford Street, Ashton. When

about 21, he entered the firm of Henry Shaw & Co., in Furnace Street, Dukinfield. This firm, founded by his father, was the predecessor of the present-day "Compo" Ltd. After serving in the works he became a traveller. For some time he was managing director, and on the death of his father, in November 1915, he became governing director.

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TENNIS TOURNAMENT FINALS

The finals of the eighth annual CHEMICAL AGE *Lawn Tennis Tournament will be held to-day week (September 3) at Alderbrook Park, Cranleigh, Surrey, by kind invitation of Mr. A. Van den Bergh, chairman of Van den Bergh's and Jurgen's, Ltd., and joint vice-chairman of Lever Brothers and Unilever, Ltd. As time is now short, members of the chemical industry wishing to attend should apply for tickets as soon as possible to the Editor,* THE CHEMICAL AGE, *Bouverie House, 154 Fleet Street, E.C.4.*

The finalists are: Men's Singles—R. J. Sleap (United Yeast Co., Ltd.) v. G. W. Hole (Anglo-Saxon Petroleum Co., Ltd.) Men's Doubles: R. J. Sleap and F. Darton (J. Buchanan and Co., Ltd.) v. G. W. Hole and C. G. Smith (Shell-Mex and B.P. Ltd.). In the semi-finals of the singles R. J. Sleap beat E. Pavitt (Co-operative Wholesale Society, Ltd.), 6-0, 6-3, 6-3, and G. W. Hole beat C. G. Copp (Doulton and Co., Ltd.), 7-5, 6-4, 3-6, 7-5.

From Week to Week

THE NEW SYNTHETIC AMMONIA PLANT which is being erected at Deer Park, Victoria, by Imperial Chemical Industries of Australia and New Zealand, Ltd., will cost £500,000.

AN ORDER CAME INTO FORCE on July 23, prohibiting (except under licence) the importation into Germay of extracts from blue dye wood and extracts from yellow and red dye wood, also extracts from other vegetable dye materials.

NUMEROUS REQUESTS HAVE BEEN RECEIVED FOR COPIES of the huge chart in the Coal Pavilion at the Empire Exhibition, Glasgow, which shows the chemical by-products obtainable from coal as now being manufactured in Great Britain.

DORMAN LONG AND CO., LTD., are closing the coke oven plants at Redcar Iron and Steel Works, and Redcar town will be supplied with gas from the new coke ovens at the Cleveland works by way of a pipeline.

DUTIES ON CERTAIN GOODS imported into Mexico were modified by a decree effective from August 30, except for shipments made on August 15. The duties have been slightly reduced on artificial silk in skeins, crude rubber, chemical cyanide and vegetable dyes.

FIFTY WAGONS OF ALL-STEEL CONSTRUCTION, each with a carrying capacity of 16 tons, are to be built by the L.M.S. Railway for the conveyance of light soda ash in bulk, on behalf of Imperial Chemical Industries, Ltd. The wagons are to be in service by the end of the year.

THE SULPHITE PULP PRODUCERS of Finland, Norway and Sweden, met at Helsingfors on August 19, when it was decided, in view of the prevailing trade conditions, to effect a curtailment of production over one year, equivalent to fifteen weeks. There is to be a stoppage of eight weeks in each country by the end of the year.

THE FUEL LUNCHEON CLUB holds a meeting once a month between October and May of each year at the Connaught Rooms, Great Queen Street, Kingsway, W.C.2, when addresses are given by prominent people on subjects of general interest to the fuel industry. Full particulars regarding membership, the annual subscription of which is 10s., will be sent on application to the Secretary, Fuel Luncheon Club, 53 Victoria Street, London, S.W.1.

THE OXLEY ENGINEERING CO., LTD., held their annual sports day at Sicklinghall, near Wetherby, on August 13. The staff and workpeople, together with friends, amounted to nearly one hundred, and the chairman and managing director, Mr. H. H. Hollis, attended. In the afternoon the office staff v. works cricket match took place, the former winning for the second year in succession. After tea various events were arranged which proved interesting and entertaining, and prizes were presented by Mr. Hollis.

MR. OLIVER STANLEY, President of the Board of Trade, will open the National Coal Convention in London on October 5. Production of oil from coal and the substitution for imported petrol or Diesel oil of producer gas are matters which will form an important part of the Convention business. Representatives of associations of colliery owners, wholesale coal distributors, retail coal merchants, co-operative associations dealing in coal, colliery managers, coal exporters and makers of coal-burning appliances and equipment, engineers and scientists will discuss their several problems.

THE SHIPMENTS OF CHINA CLAY made during July, showed very little improvement, but there are, however, signs of recovery of trade and some of the large and more important works are re-opening this week, following a long suspension. The record of July shipping at the principal ports are as follows: Fowey, 26,720 tons of china clay (against 46,914 tons in July last year); 1,665 tons of china stone, 2,426 tons of ball clay. Par, 9,139 tons of china clay, 103 tons china stone. Charlestown, 5,143 tons of china clay, 492 tons of china stone. Padstow, 991 tons of china clay. Plymouth, 215 tons of china clay, whilst 4,331 tons of china clay were conveyed to destination by rail, making an aggregate of 51,225 tons for the month, compared with 79,835 tons in July, 1937, which reveals a decline of 28,610 tons.

MID-YEAR REPORTS from the United States show a drop of only 4 per cent. in the production and shipment of phosphate rock by American miners. A decline of almost 16 per cent. in apparent consumption in the United States was offset by a substantial recovery in the tonnage exported and, due in part to the fact that the prices on export business are much higher than those on domestic sales, the value of total shipments during the first six months of the current year was a great deal higher than it was during the corresponding period of 1937. The total quantities of phosphate rock sold or used in the United States, as compiled from reports to the Bureau of Mines, was 1,860,787 long tons valued at $6,740,616 during the half-year ended June 30, 1938, compared with 1,930,582 tons worth $5,922,332 during the 1937 period.

NEW SLIDER RESISTANCES, which are specially suitable for use in laboratories and for purposes where it is required to vary the supply of electric current to apparatus, are described in a new leaflet of A.E.W., Ltd.

TWENTY MACHINE PRINTERS employed at the works of the United Turkey Red Co., Ltd., Alexandria, Dumbartonshire, have been on strike since August 17, in support of a demand for an increase in wages.

THE FIRST CONTINGENT OF THE 10,000 EMPLOYEES of Lever Bros., Port Sunlight, who are to visit the Empire Exhibition, Glasgow, toured the Exhibition on August 20. The employees are visiting the exhibition as the guests of the company.

THE CLYDE ALLOY STEEL CO., LTD., is now established in the new laboratories which were erected at the company's works at Craigneuk, Motherwell. These laboratories are fully equipped with apparatus of the latest type for routine testing and research.

SOUTHEND TOWN COUNCIL are to purchase a water chlorination plant of the Chlorograph type from the Paterson Engineering Co., Ltd., at an approximate cost of £220, for use at their Shoeburyness Waterworks.

CONSIDERABLE STOCKS OF NITRATE are understood to be held by the Chilean Nitrate and Iodine Sales Corporation in Spanish territory controlled by the Burgos authorities. An arrangement has now been reached whereby those authorities will take over such nitrate stocks in exchange for the barter of Spanish goods, including oil, cork and steel.

NORTH-EASTERN TRADING ESTATES, LTD., who are responsible for the administration of Team Valley Trading Estate, have appointed Colonel E. N. Evelegh to undertake the duties of liaison with tenants, social welfare of employees and A.R.P. The Team Valley authorities find that their tenants consult them on points ranging from the mending of a tap to a complete marketing scheme for their products.

BROTHERTON AND CO., LTD., the well-known chemical manufacturers, will celebrate their diamond jubilee on September 1. It was on September 1, 1878, that the late Lord Brotherton began business as an ammonia distiller at Wakefield. The present chairman of the company is Mr. Charles Brotherton, J.P., nephew of the founder, and the company now operates works in Leeds, Wakefield, Birmingham, Liverpool and Bromborough.

THE INTERNATIONAL UNION OF FOREST RESEARCH ORGANISATIONS' Permanent Sub-Committee will meet in Britain next year, probably in April. The formation of the Committee in 1929 marked the post-war resumption of official international relations in forest research. The Timber Sub-Committee will meet at the Forest Products' Research Laboratory at Princes Risborough, Bucks. This committee is composed of leading European experts, and it is possible that the directors of research laboratories in Canada and the United States will co-operate.

THE OFFICIAL PRICE OF PLATINUM has been raised 15s. to £8 per ounce. This increase is the result of a recent improvement in demand both in this country and in the United States, which has bought a fair quantity in the past few weeks. This is the fourth change in the official quotation this year. The price was reduced on January 4 from £7 12s. 6d. to £7 per ounce. It was then raised to £7 10s. at the beginning of February, but was later reduced to £7 5s. The current quotation of £8 compares with £8 15s. at this time last year, and with the 1937 peak of £14.

UP TO THE END OF JULY, 1938, offers of contributions towards rent, rates and income tax had been made to 62 industrial undertakings to induce them to set up factories in the Special Areas of England and Wales, and further negotiations were in progress. On the Team Valley Trading Estate, near Gateshead, 68 factories had been completed up to the end of July, 64 being occupied and employing 1,568 people. On the South Wales Trading Estate, at Treforest, 22 factories were occupied at the end of July, giving employment to 459 people. Two factories had been built at Maryport, West Cumberland.

FEWER NEW COMPANIES WERE REGISTERED in England and Scotland last year than in 1936, the number falling from 14,381 to 13,344. According to the Board of Trade's annual report on companies these new undertakings had a total nominal capital of £120,302,501, a decrease of £44,119,537 compared with the previous year. Excluding companies in the course of liquidation or removal from the Register, the number on the Register at December 31, was 155,279. Of these, 17,761 were public and 137,518 private companies. The number of companies dissolved or struck off the register during the year was 7,245—6,549 in England and 696 in Scotland. Of the 13,344 new companies registered last year, 124 were registered without share capital. Of those registered with share capital, 331 were public companies with an aggregate nominal capital of £38,284,959, and 12,889 were private companies with an aggregate nominal capital of £82,017,542.

Weekly Prices of British Chemical Products

THE demand for general chemicals continues to follow a steady course and values, with few exceptions, are maintained at recent levels. There are signs of some improvement in the volume of inquiry for new business and ex-contract deliveries are also satisfactory. There are no important price changes to record for general chemicals, rubber chemicals and wood distillation products. There is little change in the market conditions for coal tar products. Toluol is a little firmer, but, in the continued absence of any firm buying orders, quotations remain on a nominal basis.

Price Changes

Rises: Lead Acetate, white (Manchester).

Falls: Carbolic Acid, dehydrated. Pyridine, 90/140%; 90/160%; 90/180%.

MANCHESTER.—Although slightly more active than they have been during recent weeks chemical products on the Manchester market remain under holiday influences and on the Royal Exchange the attendance of buyers has been small. There has been no more than a moderate aggregate movement of textile chemicals against contracts, and not much improvement can be looked for until the holiday season in the cotton towns comes to an end in about a fortnight. In other directions the takings against contracts are on a fair scale. So far as new business is concerned conditions have been on the quiet side. In one or two sections of the by-products market the demand is fair, but taking this section as a whole there has been little change for the better.

GLASGOW.—There has been a rather better demand for chemicals for home trade during the week, though export inquiries still remain very limited. Prices generally continue quite firm at about previous figures, copper and lead products being rather dearer in sympathy with the metals.

General Chemicals

ACETONE.—**£45 to £47 per ton.**

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lancs. GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey, £18 10s. per ton, d/d U.K. Fine white, 98%, £17 per ton, d/d U.K.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8½d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 10s. per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 5s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt. drums (4-drum lots); 3½d. per lb. d/d station in 70-lb. cylinders (1-ton lots).

CHROMETAN.—Crystals, 2½d. per lb.; liquor, £13 per ton d/d station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—10d. per lb., less 2½%; d/d U.K.

CHROMIC OXIDE.—11d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0¼d. per lb. MANCHESTER: 1s. 0¼d. SCOTLAND: B.P. crystals, 1s. 0½d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£18 5s. per ton, less 2% in casks. MANCHESTER: £18 10s. per ton f.o.b. SCOTLAND: £18 15s. per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£20-£22 per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £4 2s. 6d. to £5 2s. 6d. per cwt. according to quantity; in drums, £3 15s. 0d. to £4 7s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 9d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £30; brown, £1 per ton less. MANCHESTER: White, £31; brown, £30.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£30 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £30 per ton, less 2¼% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £30 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—Calcined, in bags, ex works, about £8 per ton. SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—Solid (ex wharf) £5 10s. per ton. SCOTLAND: £7 5s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 10d. per lb.; powder B.P., 6s. 0d.; bichloride B.P. (corros. sub.) 5s. 1d.; powder B.P. 4s. 9d.; chloride B.P. (calomel), 5s. 10d.; red oxide cryst. (red precip.), 6s. 11d.; levig. 6s. 5d.; yellow oxide B.P. 6s. 3d.; persulphate white B.P.C., 6s. 0d.; sulphide black (hyd. sulph. cum sulph. 50%), 5s. 11d. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s to £40 per ton according to quantity, ex store; broken, £42 per ton. MANCHESTER. £38.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4½d. per lb. MANCHESTER: £37 per ton.

POTASSIUM DICHROMATE.—5½d. per lb. carriage paid. SCOTLAND: 5½d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 6s. 3d. per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 10¾d. to 11¼d.

POTASSIUM PRUSSIATE.—6½d. per lb. SCOTLAND: 6¾d. net, in casks, ex store. MANCHESTER: Yellow, 6¼d. to 6½d.

PRUSSIATE OF POTASH CRYSTALS.—In casks, 6¾d. per lb. net, ex store.

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 11s. per ton.
SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.
SODA, CAUSTIC.—Solid, 76/77° spot, 13s. 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE.—£19-£20 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.
SODIUM BICARBONATE.—Refined spot, £10 15s. per ton d/d station in bags. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 15s.
SODIUM BISULPHITE POWDER.—60/62%, £14 10s. per ton d/d in 2-ton lots for home trade.
SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.
SODIUM CHLORATE.—£27 10s. to £32 per ton. GLASGOW: £1 11s. per cwt., minimum 3 cwt. lots.
SODIUM DICHROMATE.—Crystals cake and powder 4½d. per lb. net d/d U.K. with rebates for contracts.
SODIUM CHROMATE.—4½d. per lb. d/d U.K.
4d. per lb. GLASGOW: 4½d. net, carriage paid.
SODIUM HYPOSULPHITE.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.
SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.
SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d. GLASGOW: £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.
SODIUM NITRITE.—£18 5s. per ton for ton lots.
SODIUM PERBORATE.—10%, 9½d. per lb. d/d in 1-cwt. drums.
SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £16 10s. per ton delivered per ton lots.
SODIUM PRUSSIATE.—½d. per lb. for ton lots. GLASGOW: 5d. to 5¾d. ex store. MANCHESTER: 4¼d. to 5¼d.
SODIUM SILICATE.—£8 2s. 6d. per ton.
SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.
SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.
SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.
SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.
TARTARIC ACID.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1½d. per lb. GLASGOW: 1s. 1d. per lb., 5%, ex store.
ZINC SULPHATE.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.
ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.
BARYTES.—£6 to £6 10s. per ton, according to quality.
CADMIUM SULPHIDE.—3s. 9d. to 4s. per lb.
CARBON BLACK.—3¼d. to 3 15/16d. per lb., ex store.
CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.
CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.
CHROMIUM OXIDE.—Green, 10½d. to 11d. per lb.
DIPHENYLGUANIDINE.—2s. 2d. per lb.
INDIA-RUBBER SUBSTITUTES.—White, 4¾d. to 5¼d. per lb.; dark 3¾d. to 4¼d. per lb.
LAMP BLACK.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.
LEAD HYPOSULPHITE.—9d. per lb.
LITHOPONE.—Spot, 30%, £16 10s. per ton, 2-ton lots d/d in bags.
SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.
VERMILION.—Pale, or deep, 4s. 9d. per lb., 1-cwt. lots.
ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.
CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.
NITRO CHALK.—£7 10s. 6d. per ton up to June 30, 1938.
SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1938.
CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.
AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 8d. to 1s. 8½d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d. MANCHESTER: Pure, 1s. 8d. per gal.; crude, 11½d. to 1s. per gal.
CARBOLIC ACID.—Crystals, 7½d. to 8½d. per lb., small quantities would be dearer; Crude, 60's, 1s. 10½d. to 2s. 1½d.; dehydrated, 2s. 6d. per gal., according to specification; Pale, 99/100%, per lb. f.o.b. in drums; crude, 2s. 1d. per gal.
CREOSOTE.—Home trade, 4¾d. per gal., f.o.r. makers' works; exports 6¾d. to 6¾d. per gal., according to grade. MANCHESTER: 4½d. to 5½d. GLASGOW: B.S.I. Specification, 6d. to 6½d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils 5¾d. to 6½d.
CRESYLIC ACID.—97/99%, 1s. 9d. to 2s.; 99/100%, 2s. 6d. to 3s. 6d. per gal., according to specification; Pale, 99/100%, 2s. 1d. to 2s. 3d.; Dark, 95%, 1s. 7d. to 1s. 8d. per gal. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. MANCHESTER: Pale, 99/100%, 2s. 2d.
NAPHTHA.—Solvent, 90/160, 1s. 6d. to 1s. 7d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1d. to 1s. 3d. per gal., naked at works, according to quantity. GLASGOW: Crude, 6½d. to 7¼d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.
NAPHTHALENE.—Crude, whizzed or hot pressed, £5 to £6 per ton; purified crystals, £11 10s. per ton in 2-cwt. bags. LONDON: Fire lighter quality, £3 to £4 10s. per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £14 to £15, per ton f.o.b.
PITCH.—Medium, soft, 33s. per ton, f.o.b. MANCHESTER: 31s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.
PYRIDINE.—90/140%, 11s. 6d. to 13s. 6d. per gal.; 90/160%, 9s. 6d. to 10s. 9d. per gal.; 90/180%, 2s. 6d. to 3s. 6d. per gal. f.o.b. GLASGOW: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 8s. 6d to 9s. 6d. per gal.
TOLUOL.—90%, 1s. 10d. per gal.; pure, 2s. 2d. GLASGOW: 90%, 120, 1s. 10d. to 2s. 1d. per gal.
XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 3d. to 2s. 3½d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £6 15s. to £9 5s. per ton; grey, £8 15s. to £9 5s. MANCHESTER: Brown, £8 10s.; grey, £10.
METHYL ACETONE.—40.50%, £36 to £38 per ton.
WOOD CREOSOTE.—Unrefined, 4d. to 6d. per gal., according to boiling range.
WOOD NAPHTHA, MISCIBLE.—2s. 8d. to 3s. per gal.; solvent, 3s. 3d. to 3s. 6d. per gal.
WOOD TAR.—£2 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZIDINE, HCl.—2s. 7½d. per lb., 100% as base, in casks.
BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 11½d. per lb. d/d buyer's works.
m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.
o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.
p-CRESOL, 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.
DICHLORANILINE.—2s. 1½d. to 2s. 5½d. per lb.
DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.
DINITROTOLUENE.—48/50° C., 9½d. per lb.; 66/68° C., 11d.
DIPHENYLAMINE.—Spot, 2s. 2d. per lb., d/d buyer's works.
GAMMA ACID, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.
H ACID.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.
NAPHTHIONIC ACID.—1s. 10d. per lb.
β-NAPHTHOL —£97 per ton; flake, £94 8s. per ton.
α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.
β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.
NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%.
o-NITRANILINE.—4s. 3½d per lb.
m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 10d. to 2s. 3½d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 4¾d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.
NITRONAPHTHALENE.—10½d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.
SULPHANILIC ACID.—Spot, 8¾d. per lb. 100%, d/d buyer's works.
o-TOLUIDINE.—11d. per lb., in 8/10 cwt. drums, drums extra.
p-TOLUIDINE.—1s. 11d. per lb., in casks.
m-XYLIDINE ACETATE.—4s. 8d. per lb., 100%.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

ELECTROLYTIC LUSTERING OF LIGHT METALS by anodic oxidation. Langbein-Pfanhauser-Werke, A.-G. (Germany, July 30, '37.) 22742.

PREPARATION OF COLOURING MATTERS.—J. L. Moilliet, H. J. Thurlow, and Imperial Chemical Industries, Ltd. 22539.

PRODUCTION, ETC., OF ACCELERATORS for rubber vulcanisation.—Monsanto Chemical Co. (United States, Oct. 16, '37.) 22507.

SAPONACEOUS DETERGENTS, ETC.—S. H. Munro. 23007.

PRODUCTION OF AQUEOUS COMPOSITIONS, ETC.—J. V. Nevin. (United States, Aug. 11, '37.) 22986.

PRODUCTION OF BLACK OXIDE COATINGS ON STEEL.—H. R. Priston, and S. G. Clarke. 22745.

PRODUCTION OF ANTIMONY COATINGS ON IRON, ETC.—H. R. Priston, and S. G. Clarke. 22746.

NITROGEN-CONTAINING ORGANIC COMPOUNDS.—M. A. T. Rogers, and Imperial Chemical Industries, Ltd. 22534.

WATER-REPELLENT AGENTS.—M. A. T. Rogers, and Imperial Chemical Industries, Ltd. 22850, 22851.

PROCESS FOR RECOVERING ALUMINA.—J. C. Seailles, and W. R. G. Dyckerhoff. (Luxemburg, Aug. 2, '37.) 22862.

METHODS OF OBTAINING, ETC., VOLATILE SUBSTANCES from solutions.—M. Seidel. (Germany, Aug. 3, '37.) 22674.

PRODUCTION OF HOLLOW CYLINDRICAL RECEPTACLES from acetylcellulose, etc.—R. Serenyi. 22812.

SYNTHESIS OF HIGHER ALIPHATIC HYDROCARBONS.—Studien-und Verwertungsges. (Germany, July 31, '37.) 22734; (Germany, Nov. 25, '37.) 22735.

PRODUCTION OF HALOGENS.—E. Viel. (France, July 31, '37.) 22881.

OPERATION OF VERTICAL CARBONISING-RETORTS.—Woodall-Duckham (1920), Ltd., H. H. Carey, and S. G. Vane. 22955.

PRODUCTION OR ORGANIC ACIDS BY FERMENTATION.—J. Anthony and Co., Ltd. (Lorenz). 23279.

CRYSTALLISATION OF ALKALINE EARTH METAL NITRATES.—Azogeno Soc. Anon., and C. Toniolo. (Italy, Aug. 4, '37.) 23035.

MANUFACTURE OF CELLULOSE DERIVATIVES.—British Celanese, Ltd. (United States, Aug. 14, '37.) 23458.

PRODUCTION OF TITANIUM DIOXIDE PIGMENTS.—British Titan Products Co., Ltd. (United States, Aug. 7, '37.) 23235, 23245.

PROCESS OF MAKING OLEFINE OXIDES.—Carbide and Carbon Chemicals Corporation. (United States, Aug. 7, '37.) 23281; (United States, April 12.) 23282.

MANUFACTURE OF BASIS MATERIALS for lacquers.—A. Carpmael (I. G. Farbenindustrie.) 23220.

MANUFACTURE OF N-SUBSTITUTION PRODUCTS of melamine.—A. Carpmael (I. G. Farbenindustrie.) 23491.

MANUFACTURE OF AZO DYESTUFFS.—Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. (France, Aug. 20, '37.) 23034.

PROCESS FOR THE PRODUCTION OF PERCHLORETHYLENE.—Consortium für Elektrochemische Industrie Ges. (Germany, Aug. 10, '37.) 23546.

MANUFACTURE OF AROMATIC ORGANIC COMPOUNDS.—Distillers Co., Ltd., H. M. Stanley, G. Minkhoff, and J. E. Youell. 23597.

INSECTICIDAL COMPOSITION, ETC.—Dow Chemical Co. (United States, Sept. 16, '37.) 23645.

PRODUCTION OF ORGANIC COMPOUNDS.—H. Dreyfus. 23287.

PREPARATION OF POLYMERIC AMIDES.—E. I. du Pont de Nemours and Co. (United States, Aug. 20, '37.) 23564.

PREPARATION OF THE RAW JUICE FROM BEETROOTS in the manufacture of sugar.—W. Elborne. 23288.

MANUFACTURE OF DYESTUFFS.—B. Gaspar. 23604.

METALS, ETC.—W. V. Gilbert. 23210.

PROCESS FOR IMPROVING THE STABILITY TO HEAT of shaped polyvinyl chloride, etc.—W. W. Groves (I. G. Farbenindustrie.) 23065.

MANUFACTURE OF CARBOXYLIC ACID ESTERS.—W. W. Groves (I. G. Farbenindustrie.) 23130, 23589.

TREATING, ETC., OF BULK PRODUCTS such as organic compounds, etc.—Guardite Corporation. (United States, Aug. 26, '37.) 23181; (United States, May 2.) 23182.

MANUFACTURE OF β-INDENE ACETIC ACIDS.—I. G. Farbenindustrie. (Germany, Aug. 4, '37.) 23094; (Germany, July 8.) 23095.

PROCESS OF WORKING-UP AMMONIACAL SOLUTIONS of heavy metals.—I. G. Farbenindustrie. (Germany, Sept. 14, '37.) 23593.

PRODUCTION, ETC., OF AUSTENITIC STEEL.—Jarrow Metal Industries, Ltd., F. G. Bird, and E. B. Ellis. 23486.

MANUFACTURE, ETC., OF ADDITION COMPOUNDS.—G. W. Johnson (I. G. Farbenindustrie.) 23083.

MANUFACTURE, ETC., OF VAT DYESTUFFS of the dibenzanthrone series.—G. W. Johnson (I. G. Farbenindustrie.) 23084.

MANUFACTURE, ETC., OF BUTADIENE.—G. W. Johnson (I. G. Farbenindustrie.) 23197.

MANUFACTURE, ETC., OF 2-METHYL BUTINE (3)-OL-2.—G. W. Johnson (I. G. Farbenindustrie.) 23198.

MANUFACTURE, ETC., OF AZO DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie.) 23199.

MANUFACTURE, ETC., OF NON-KNOCKING FUELS.—G. W. Johnson (I. G. Farbenindustrie.) 23365.

MANUFACTURE, ETC., OF QUATERNARY AMMONIUM COMPOUNDS.—G. W. Johnson (I. G. Farbenindustrie.) 23366.

RECOVERY OR PRODUCTION OF UNITARY CYCLIC COMPOUNDS from the products obtained in the pressure extraction of solid carbonaceous materials.—G. W. Johnson (I. G. Farbenindustrie.) (April 6, '37.) 23625.

PREPARATION OF QUINUCLIDINE, ETC.—Kastel Tvornica Kemijsko-Farmaceutskih Proiz voda D. D., and V. Prelog. (Jugoslavia, Aug. 6, '37.) 23336.

PRODUCTION OF MAGNESIUM by the thermal reduction of magnesiferous raw materials.—Magnesium Elektron, Ltd. (Germany, Dec. 4, '37.) 23469.

MAGNESIUM ALLOYS.—Magnesium Elektron, Ltd. (I. G. Farbenindustrie.) 23468.

PURIFICATION OF ORGANIC COMPOUNDS.—Manchester Oxide Co., Ltd., J. H. Clayton, and B. Bann. 23155.

RECOVERY OF ALCOHOL in the treatment of organic compounds. Manchester Oxide Co., Ltd., J. H. Clayton, and B. Bann. 23156.

PRODUCTION OF ORGANIC COMPOUNDS.—Manchester Oxide Co., Ltd., J. H. Clayton, and B. Bann. 23157.

PROCESS FOR PRODUCING ISOBUTANE from normal butane.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (Holland, Aug. 18, '37.) 23100; (Holland, June 10.) 23101.

PROCESS FOR THE MANUFACTURE OF ISOBUTANE from normal butane.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (Holland, Aug. 18, '37.) 23102; (Holland, Feb. 12.) 23103.

PRODUCTION OF UNSATURATED CARBONYL COMPOUNDS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, Aug. 6, '37.) 23385.

PRODUCTION OF DERIVATIVES of p-amino-benzene-sulphonamide.—Naamlooze Vennootschap Orgachemia. (Holland, Aug. 6, '37.) 23104.

MANUFACTURE OF HARD METAL ALLOYS.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken. (Germany, Aug. 9, '37.) 23315.

MANUFACTURE OF PURE HYDROCARBONS of the benzene series.—Niederschlesische Bergbau, A.-G. (Germany, Aug. 5, '37.) 23218; (Germany, Sept. 22, '37.) 23219.

SOAP, ETC.—R. J. Pickett (Blancato.) 23176.

MANUFACTURE OF PHYSIOLOGICALLY ACTIVE COMPOUNDS.—Schering, A.-G. (Germany, Aug. 7, '37.) 23411.

MANUFACTURE OF AZO-DYESTUFFS.—Soc. of Chemical Industry in Basle. (Switzerland, Aug. 7, '37.) 23067.

MANUFACTURE OF LACTONES of the saturated and unsaturated cyclopentanopoly-hydrophenanthrene series.—Soc. of Chemical Industry in Basle. (Switzerland, Aug. 9, '37.) 23068; (Switzerland, July 14.) 23069.

MANUFACTURE OF COMPOUNDS having the action of vitamin E. Soc. of Chemical Industry in Basle. (Switzerland, Aug. 10, '37.) 23591; (Switzerland, July 18.) 23592.

REACTION PRODUCT.—G. L. Stahly, and W. W. Carlson. (United States, Feb. 26.) 23111.

PRODUCTION OF SOLUBLE BENZYL ETHER of dextran.—G. L. Stahly, and W. W. Carlson. (United States, Feb. 26.) 23112.

MANUFACTURE OF ETHERS.—Standard Alcohol Co. (Feb. 27, '37.) (United States, Jan 22, '37.) 23021.

PRODUCTION OF OLEFIN POLYMERS.—Standard Oil Development Co. (United States, Oct. 2, '37.) 23049; (United States, Oct. 6, '37.) 23050.

MANUFACTURE OF GREASE COMPOSITION.—Standard Oil Development Co. (United States, Nov. 24, '37.) 23452.

TREATMENT OF FERROUS, ETC., METALS for rubber adhesion.—J. T. Sterrett. 23333.

COATING OF ARTICLES WITH PHENOLFORMALDEHYDE RESINS, ETC. A. H. Stevens (Heresite and Chemical Co.) 23367.

TREATMENT OF HYDROCARBON MIXTURES.—A. H. Stevens (Phillips Petroleum Co.). 23465.

PREPARATION OF CATALYSTS.—Synthetic Oils, Ltd., and W. W. Myddleton. 23302.

MOTOR FUELS.—Synthetic Oils, Ltd., and W. W. Myddleton. 23303.

PRODUCTION OF STABLE, ETC., ORGANIC CALCIUM SALT SOLUTIONS. J. A. Wülfing. (Germany, Aug. 6, '37.) 23386.

ARTICLES OF SYNTHETIC MATERIAL having metallic coatings.—R. Bosch Ges. (Germany, Aug. 14, '37.) 23972.

MANUFACTURE OF MALLEABLE IRON.—British Furnaces, Ltd. (Surface Combustion Corporation). 24001.

MANUFACTURE OF COMPOUNDS OF p-TOLYLMETHYLCARBINOL.—

Chemisch-Pharmazeutische, A.-G., Bad-Homburg, and E. Kohlstedt. 23865.

PRODUCTION OF INSECTICIDES.—Corn Products Refining Co. (United States, Aug. 21, '37.) 23828.

TREATMENT OF CELLULOSIC TEXTILE MATERIALS.—Courtaulds, Ltd., and J. Boulton. 24023.

DYEING OF CELLULOSE ESTERS.—Courtaulds, C. M. Whittaker, and C. C. Wilcock. 23745.

METHOD OF CALCINING.—L. T. Davies. 24010.

HYDROGENATION OF OITICICA OIL.—E. I. du Pont de Nemours and Co. (United States, Aug. 11, '37.) 23750.

MANUFACTURE OF INSECT-REPELLENT MATERIALS, ETC.—E. I. du Pont de Nemours and Co. (United States, Aug. 6, '37.) 24029.

MANUFACTURE OF AZO DYESTUFFS.—E. I. du Pont de Nemours and Co. 24028.

PROCESS FOR DEVELOPING DYESTUFFS in colour printing.—Durand and Huguenin, A.-G. (Germany, Aug. 16, '37.) 24136.

SEPARATION OF CONSTITUENTS OF HYDROCARBON OILS, ETC.—Edeleanu Ges. (Germany, Sept. 6, '37.) 24235.

BRIGHT ANNEALING OF BRASS, ETC., ALLOYS.—General Electric Co., Ltd., I. Jenkins, and S. V. Williams. 24115.

DESULPHURISING MOTOR FUELS.—Gewerkschaft M. Stinnes. (Germany, Sept. 8, '37.) 24109.

SEPARATION OF MIXTURES of fatty oils, etc., by means of liquid sulphur dioxide.—W. W. Groves (Edeleanu Ges.). 24137.

PROCESS OF DYEING.—W. W. Groves (I. G. Farbenindustrie.) 24006.

MANUFACTURE OF AROMATIC NITRILO-COMPOUNDS, ETC.—W. W. Groves (I. G. Farbenindustrie.) 24007.

MANUFACTURE OF STABLE NEUTRAL SOLUTIONS of the blood-sugar controlling pancreas hormone.—W. W. Groves (I. G. Farbenindustrie.) 24008.

MANUFACTURE OF CONDENSATION PRODUCTS of the naphthalimide series.—W. W. Groves (I. G. Farbenindustrie.) 24131.

MANUFACTURE OF ACID WOOL DYESTUFFS of the anthraquinone series.—W. W. Groves (I. G. Farbenindustrie.) 24132.

MANUFACTURE OF ETHERS.—W. W. Groves (I. G. Farbenindustrie.) 24133.

MANUFACTURE OF SULPHONES.—W. W. Groves (I. G. Farbenindustrie.) 24134.

MANUFACTURE OF CAPILLARY ACTIVE SUBSTANCES.—W. W. Groves (I. G. Farbenindustrie.) 24135.

PRODUCTION OF A THERAPEUTIC PREPARATION from plants containing chlorophyll.—J. Heller. 23708.

MANUFACTURE OF SYNTHETIC RUBBER-LIKE MASSES.—I. G. Farbenindustrie. (Germany, Aug. 11, '37.) 23758.

MANUFACTURE OF RAW MATERIALS for lacquers.—I. G. Farbenindustrie. (Germany, Aug. 14, '37.) 24061; (Germany, Jan. 1.) 24062.

MANUFACTURE OF CONDENSATION PRODUCTS.—I. G. Farbenindustrie. (Germany, Aug. 17, '37.) 24177.

METHOD, ETC., OF MAKING CHEMICAL ANALYSES.—G. Kent, Ltd., and R. S. Medlock. 23759.

STABILISATION OF POLYVINYL RESINS.—Kodak, Ltd. (United States, Aug. 14, '37.) 24040.

PRODUCTION OF ARTIFICIAL THREADS, etc., of cellulose ethers, etc.—F. D. Lewis. 23960.

MANUFACTURE OF MAGNESIUM DUST BRIQUETTES.—Magnesium Metal Corporation, Ltd. (American Magnesium Metals Corporation). 23941.

CHEMICAL MANUFACTURE.—Mathieson Alkali Works. (United States, Sept. 1, '37.) 24277.

APPARATUS FOR THE PRODUCTION OF LEAD OXIDE.—R. Mercer (Naamlooze Vennootschap Metallindustrie Fid). 24130.

PROCESS FOR DESULPHURISING MINERAL OILS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, Aug. 16, '37.) 23746.

Complete Specifications Open to Public Inspection

COLOURED CEMENTS and their process of manufacture.—P. Gerimont. Feb. 10, 1937. 23133/37.

REMOVING ACID COMPONENTS FROM HYDROCARBONS or derivatives thereof.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Feb. 8, 1937. 26275/37.

ZINC ALLOYS.—National Smelting Co., Ltd. Feb. 13, 1937. 31948/37.

RECOVERY OF SULPHUR DIOXIDE from gas mixtures.—Imperial Chemical Industries, Ltd. Feb. 9, 1937. 31949/37.

METHODS OF MAKING POROUS RUBBER ARTICLES from aqueous emulsions or dispersions thereof.—Firestone Tyre and Rubber Co., Ltd. Feb. 11, 1937. 2080/37.

MANUFACTURE OF MIXED LEAD and lead oxide.—National Lead Co. Feb. 10, 1937. 2770/37.

MANUFACTURE OF UNSATURATED KETONES containing a sterol nucleus.—A. G. Bloxam. Feb. 13, 1937. 3127/38.

LATEX COMPOSITIONS.—Belvedere Chemical Co., Ltd. Feb. 13, 1937. 3925/38.

PRODUCTION OF FADELESS TANNING AGENTS.—J. R. Geigy, A.-G. Feb. 10, 1937. 4034/38.

MANUFACTURE OF AZO-DYESTUFFS and intermediate products.—Soc. of Chemical Industry in Basle. Feb. 10, 1937. 4046/38.

MANUFACTURE OF CONDENSATION PRODUCTS.—Soc. of Chemical Industry in Basle. Feb. 10, 1937. 4048/38.

CHEMICAL COMPOUND.—British United Chemicals, Ltd. Feb. 12, 1937. 4110/38.

METHOD OF AND APPARATUS FOR GENERATING A REDUCING GASEOUS MIXTURE controlled and continuous at low temperature and for commercial utilisation of the gaseous mixture.—G. G. Johnston. Feb. 10, 1937. (Cognate Applications, 20560/38 and 20561/38.) 4177/38.

PREPARING INTERFACE MODIFYING AGENTS, and interface modifying agents when so prepared.—Emulsol Corporation. Feb. 11, 1937. 4200/38.

METHOD OF RECOVERING SLAG rich in vanadium.—Dortmund-Hoerder Huttenverein, A.-G. Feb. 11, 1937. 4203/38.

PREPARING DERIVATIVES of amino-benzene-sulphamides.—Chinoin Gyogyszer es Vegyeszeti Termekek Gyara Reszvenytarsasag. Feb. 13, 1937. 4233/38.

PROCESS FOR THE MANUFACTURE OF BERYLLIUM OXIDE.—Seri Holding Soc. Anon. Feb. 12, 1937. 4413/38.

LEAD ALLOYS.—Chloride Electrical Storage Co., Ltd. Feb. 13, 1937. 4581/38.

Specifications Accepted with Dates of Application

COLOURING CELLULOSE ESTERS or ethers.—L. S. E. Ellis (Soc. Rhodiaceta). Dec. 11, 1936. 490,283.

MANUFACTURE OF ORTHO- AND PARA-N-SUBSTITUTED AMINOARYLSULPHONES.—A. Carpmael (I. G. Farbenindustrie.) Dec. 21, 1937. 490,043.

PREPARATION OF LACTONES.—L. Mellersh-Jackson (Givaudan and Cie Soc. Anon., L.). Jan. 4, 1937. 490,044.

MANUFACTURE OF GLUCOSIDES and glucoside-like compounds.—W. W. Groves (I. G. Farbenindustrie.) Jan. 9, 1937. (Sample furnished.) 490,360.

MANUFACTURE OF WASHING AGENTS.—W. W. Groves (I. G. Farbenindustrie.) Jan. 11, 1937. (Samples furnished.) 490,285.

METHOD OF CONVERTING ALIPHATIC POLYHYDRIC ALCOHOLS to alcohols of lower molecular weight.—Association of American Soap and Glycerin Producers, Inc. Feb. 7, 1936. 490,211.

MANUFACTURE OF SUBSTITUTED ALIPHATIC CARBOXYLIC ACIDS.—W. W. Groves (I. G. Farbenindustrie.) Feb. 9, 1937. 490,416.

MANUFACTURE AND PRODUCTION OF AMINO COMPOUNDS.—G. W. Johnson (I. G. Farbenindustrie.) Feb. 9, 1937. (Sample furnished.) 490,364.

MANUFACTURE OF AZO DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie. Feb. 9, 1937. 490,289.

ELECTRODEPOSITION OF ZINC.—V. Hoffman. Feb. 25, 1936. 490,145.

MANUFACTURE AND PRODUCTION OF POLYMERISATION PRODUCTS.—G. W. Johnson (I. G. Farbenindustrie.) Feb. 10, 1937. 490,366.

MANUFACTURE OF FORMAMIDE.—E. I. du Pont de Nemours and Co., and W. B. Tanner. Feb. 10, 1937. 490,228.

ALLOYS OF ALKALINE EARTH METALS with aluminium.—Calloy, Ltd., and G. N. Kirsebom. Feb. 11, 1937. 490,421.

TREATMENT OF RUBBER.—E. I. du Pont de Nemours and Co. Feb. 11, 1936. 490,292.

METHOD OF GIVING CERAMIC MATERIAL A COATING OF METAL.—Steatit-Magnesia, A.-G. Feb. 11, 1936. 490,232.

MANUFACTURE OF DYESTUFFS of the anthraquinone series.—A. Carpmael (I. G. Farbenindustrie.) Feb. 12, 1937. 490,372.

PRODUCTION OF ALCOHOLATES and anhydrous alcohols.—Mathieson Alkali Works. Feb. 24, 1936. 490,387.

PRODUCTION OF ALCOHOLATES of higher alcohols.—Mathieson Alkali Works. Aug. 26, 1936. 490,388.

MANUFACTURE OF AZO DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie.) Feb. 15, 1937. 490,389.

PREPARATION OF COKING COALS prior to their distillation.—Compagnie Generale Industrielle. Feb. 13, 1936. 490,390.

SOLID CARBONACEOUS FUELS.—J. B. Toustou. Feb. 18, 1936. 490,064.

MANUFACTURE OF CELLULOSE DERIVATIVES which are soluble in cold water.—Henkel and Cie Ges. March 27, 1936. 490,303.

MANUFACTURE OF SULPHUR DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie.) March 10, 1937. (Addition to 467,920. 490,067.

PROCESS FOR THE MANUFACTURE OF DERIVATIVES of 2.6-dihydroxypyridine-4-carboxylic acid.—Schering-Kahlbaum, A.-G. March 23, 1936. 490,073.

CONVERSION OF CARBON MONOXIDE by means of hydrogen.—I. G. Farbenindustrie. May 22, 1937. 490,090.

LOW TEMPERATURE DISTILLATION OF FUELS.—Soc. Chimique de la Grande Paroisse Azote et Produits Chimiques. June 30, 1936. 490,264.

PRODUCTION OF CLEANSING AGENTS.—I. G. Farbenindustrie. Oct. 10, 1936. 490,092.

PROCESSES FOR THE MANUFACTURE OF DIESEL and like fuels.—F. Uhde, and T. W. Pfirrmann. July 23, 1936. 490,094.

METHODS OF PRODUCING COMMERCIAL ALKALI PHOSPHATES.—Persil-Ges. Henkel and Voith Ges. Sept. 21, 1936. 490,327.

METHOD OF PRODUCING PURE ALUMINA.—A. S. Burman. Aug. 23, 1937. 490,099.

IRON ALLOY for the production of rolls.—Stromsas Jernverks, Aktiebolag. Aug. 23, 1937. (Convention date not granted.) 490,100.

OBTAINING CELLULOSE FROM VEGETABLE RAW MATERIALS.—B. Bartfay. Aug. 23, 1937. 490,101.

OBTAINING CELLULOSE FROM VEGETABLE RAW MATERIALS.—B. Bartfay. Aug. 24, 1937. 490,102.

DYEING OR PRINTING ACETATE ARTIFICIAL SILK.—I. G. Farbenindustrie. Aug. 28, 1936. 490,329.

PRODUCTION OF FOAM GLASS.—J. Kloubek, and B. Weiner. Aug. 31, 1936. 490,168.

METHOD OF PRODUCING A RAW MATERIAL consisting of barium sulphate.—E. Alberti (trading as Vereinigte Werke Dr. R. Alberti and Co.). Oct. 19, 1936. 490,171.

DISTILLATION OF PULVERULENT FUEL.—O. Bormann. Oct. 30, 1936. 490,107.

PRODUCTION OF VINYL ESTERS.—Carbide and Carbon Chemicals Corporation. Nov. 11, 1936. 490,334.

OBTAINING SALTS OF SULPHANILAMIDE with non-volatile acids.—M. Woelm. Jan. 26, 1937. 490,350.

OXIDATION PROCESSES.—E. Berl. Feb. 25, 1937. (Divided out of 5667/37. 490,123.

Books Received

Newer Methods of Volumetric Chemical Analysis. By Wilhelm Böttger, trans. Ralph E. Oesper. London: Chapman and Hall, Ltd. Pp. 268. 18s. 6d.

The Advancement of Science. British Association for the Advancement of Science. London: British Association. Pp. 262. 3s. 6d.

New Companies Registered

City Laboratories, Ltd. 343,501.—Private company. Capital £500 in £1 shares (490 6 per cent. non-cumulative preference and 10 ordinary). To carry on the business of analytical laboratories and consulting chemists, etc. Directors: Alexander H. Hayes, Helan Brae, Winifred Road, Coulsdon, Surrey; Wm. S. Stevens, Jules Cofman-Nicoresti. Registered office: 27 Fetter Lane, E.C.4.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British India.—A firm of agents established at Calcutta wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of oils and paints for India. (Ref. No. 136.)

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

Mortgages and Charges

CHARLES NEWTON (CHEMICAL WORKS), LTD., London, N. (M., 27/8/38.) August 11, £500 debenture, to C. Newton, London; general charge.

GLEGG RESEARCH LABORATORIES, LTD., Tunbridge Wells. (M., 27/8/38.) August 11, series of £15,000 debentures, present issue £5,000; general charge.

Satisfactions

ARTHUR J. DICKINSON, LTD., London, S.E., tar distillers. (M.S., 27/8/38.) Satisfaction August 11, £800, registered May 18, 1931.

PARKIN NESS AND CO., LTD., Darlington, chemical manufacturers, etc. (M.S., 27/8/38.) Satisfaction August 10, of mortgage registered January 24, 1927.

WILLIAM BEARDMORE AND CO., LTD., London, S.W., steel manufacturers. (M.S., 27/8/38.) Satisfaction August 15, of bond and disposition registered August 9, 1915, to extent of £112,899 17s. 11d., being the balance outstanding.

Declaration of Solvency Filed

CORNISH KAOLIN, LTD., London, E.C. (D.S.F., 27/8/38.) August 16.

Receiverships

OCALDO PRODUCTS, LTD., 50 John Street, Manchester, soap manufacturers. J. Wormwell, 4 Norfolk Street, Manchester, ceased to act as receiver on August 4, 1938.

AJOTAL, LTD., 15 and 17 King Street, St. James's, S.W.1, soap manufacturers, etc. D. D. C. Giddins, 7 and 8 Great Winchester Street, E.C., has been appointed receiver and manager, August 10, 1938, under powers contained in debenture dated April 5, 1937.

Chemical and Allied Stocks and Shares

THE new Stock Exchange account which commenced on Monday has not brought any change to the general trend in the stock and share markets. The volume of business in industrial and other securities has shown a further decline, and as a result, prices have moved against holders. No heavy liquidation has been reported, but with markets in their present inactive state, the tendency is for only a small amount of selling to result in rather sharp declines in prices of individual shares.

Shares of companies associated with the chemical and allied industries have reflected the trend to lower levels, particularly as in many cases they have a large following and, therefore, tend to move very closely in accordance with the surrounding tendency of markets. Imperial Chemical at 31s. are, however, only 4½d. lower on the week, and were relatively steady, aided by hopeful views of the forthcoming interim dividend. On the other hand, British Oxygen have reacted several shillings to 65s. 10½d., while Murex are 76s. 9d., compared with 77s. 6d. a week ago. Turner and Newall are 77s. 6d. compared with 77s. 9d. Triplex Glass at 30s. 6d. show a loss of 2s. 9d., but are now "ex" the recently-declared dividend of 25 per cent. Lancegaye Safety Glass shares were slightly lower at 3s. 3d., but British Indestructo Glass shares were well maintained at 3s. 6d. United Glass Bottle were 1s. lower at 49s. 6d., awaiting the interim dividend announcement.

Boots Pure Drug are 40s. at the time of writing, compared with 41s. 3d. a week ago, but Timothy Whites and Taylors were unchanged at 25s., and Sangers are 23s., compared with 23s. 4½d. a week ago. Beechams Pills deferred shares have been firm at 57s. 6d. on further consideration of the directors' capital and bonus proposals. British Industrial Plastics were again 2s. 9d., and British Glues 5s., but the shares of the last-named company were inactive, and little business was reported in British Tar Products ordinary, which are quoted at 10s. Newton Chambers shares were 40s. at Sheffield.

Staveley Coal and Iron have been lowered to 45s. 3d. on doubts whether the forthcoming results will show the maintenance of the cash bonus, as the directors might decide to follow an even more conservative policy than usual. United Steel ordinary at 21s. 6d. were slightly better on hopes that the final dividend may be maintained, but Dorman Long at 20s., and Guest Keen at 23s., have made lower prices this week. Tube Investments were also lower at 80s. 3d., although the market remains hopeful that the dividend will at least be maintained.

Courtaulds at 31s., have been well maintained, and British Celanese were reported to be rather more active, but Calico Printers ordinary, which remained under the influence of the recently-issued results, have been lowered to 4s. 7½d.

General Refractories were dull at 12s., the disposition being to await the impending interim dividend decision. Associated Portland Cement, whose interim payment is due shortly, were lower at 78s. 9d., and among other shares on which payments are due shortly, Pinchin Johnson were lowered 1s. 3d. to 28s. 9d., awaiting the declaration of the interim distribution. British Plaster Board reacted to 25s. 9d., and Imperial Smelting have kept at the lower price of 10s. British Aluminium were again relatively steady and have improved 3d. to 49s.

International Nickel made a rather better price in sympathy with the trend of Wall Street, and among other shares with an international market, Swedish Match were reported to be rather more active around 25s., there being hopes that it may not be long before dividend payments are resumed by the latter company. Monsanto Chemicals 5½ per cent. preference were maintained at 22s. 6d., and Greeff Chemicals Holdings 5s. units were again quoted at 6s. 3d., and B. Laporte ordinary at 87s. 6d. Fison, Packard and Prentice were maintained at 35s., but were reported to be less active this week.

Oil shares have been reactionary owing to the surrounding trend on the Stock Exchange.